2002 ANNUAL REPORT ON THE ENVIRONMENTAL CONDITIONS OF VIRGINIA'S CHESAPEAKE BAY AND TRIBUTARIES, IMPLEMENTATION OF THE CHESAPEAKE BAY AGREEMENT, AND IMPLEMENTATION OF TRIBUTARY STRATEGIES FOR THE REDUCTION OF NUTRIENTS AND SEDIMENTS

2002 Report of
The Secretary of Natural Resources

November 2002

COMMONWEALTH of VIRGINIA

Office of the Governor

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December 30, 2002

Honorable Members of the General Assembly:

The attached report details Virginia's efforts related to the restoration and protection of Chesapeake Bay. 2002 was an important year for Virginia's involvement in the regional Chesapeake Bay Program. On October 31, 2002 Governor Warner was elected Chairman of the Chesapeake Executive Council whose members lead the Chesapeake Bay restoration effort. 2002 was also a year that presented great challenges because of the fiscal condition of the Commonwealth and her state and federal partners in this effort. It is my hope that despite the fiscal difficulties we face, we can make progress. However, it will not be easy.

2002 was also a year where the magnitude of our water quality challenges came more clearly into focus. A central commitment of the Chesapeake 2000 Agreement ("C2K") is to remove the Chesapeake Bay and its tidal rivers from the EPA list of "impaired" waters. If "delisting" is achieved, we will avoid the regulatory process of developing and implementing a bay-wide total maximum daily load (TMDL) plan. However, delisting will not be easy. Early indications show that significant reductions of nutrients and sediments will be required beyond those already achieved. While I believe it is fair to say that we have arrested the decline in the water quality conditions of the Bay, permanent improvements will require financial resources, governmental leadership, private industry involvement and the active commitment of citizens throughout the watershed.

This report contains three major components. Part I presents a summary of the current water quality conditions in the Chesapeake Bay and its major tributaries. Part II presents an overview of the C2K Agreement and reviews activities related to its major commitments. It outlines the work of Virginia state agencies and details the immense challenges that remain. I encourage you to carefully review this section and contact my office should you have specific questions. This year's report also includes a section that reviews the activities of local governments which are important partners in our Chesapeake Bay restoration efforts.

Finally, Part III details the status of Virginia's tributary strategy program. Ten years ago, Virginia embarked on an effort to address water quality issues on a tributary by tributary basis. We have made progress in each river basin, however, much remains to be done.

I hope you will find the information presented here interesting and useful. I look forward to working with each of you over the coming years to restore and protect the Chesapeake Bay.

Sincerely,

W. Tayloe Murphy, Jr.

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2002 Report of
The Secretary of Natural Resources
to the

- House Committee on Agriculture, Chesapeake and Natural Resources
- Senate Committee on Agriculture, Conservation and Natural Resources
- House Committee on Appropriations
- Senate Committee on Finance
- Virginia Delegation to the Chesapeake Bay Commission

Submitted in accordance with
Title 2.2, Chapter 2, Sections 220 & 220.1
of the Code of Virginia

November 2002

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LIST OF STATE ENTITIES NOTED IN REPORT

Throughout this Report abbreviations are frequently used in place of the full names of Virginia state entities (agencies, institutions, foundations, etc.). This has been done to save space and to make the report more readable. This list of state entities noted in the Report is provided here so as to remind the reader of those abbreviations and to serve as an easily located reference. In Part Two most of the assessments of the individual commitments contain a list of participating state entities. Those lists are in alphabetical order and are not meant to indicate relative roles in the implementation of a given commitment.

Abbreviation	Name of State Entity
CBLAD	Chesapeake Bay Local Assistance Department
DCR	Department of Conservation and Recreation
DEQ	Department of Environmental Quality
DGIF	Department of Game and Inland Fisheries
DGS	Department of General Services
DHCD	Dept. of Housing & Community Development
DHR	Department of Historic Resources
DMME	Department of Mines, Minerals & Energy
DOE	Department of Education
DOC	Department of Corrections
DOF	Department of Forestry
MRC	Marine Resources Commission
ODU	Old Dominion University
SCC	State Corporation Commission
SMV	Science Museum of Virginia
TAX	Department of Taxation
VCE	Virginia Cooperative Extension
VCU	Virginia Commonwealth University
VDACS	Dept. of Agriculture & Consumer Services
VDH	Virginia Department of Health
VDOT	Virginia Department of Transportation
VHDA	Virginia Housing Development Authority
VIMS	Virginia Institute of Marine Science
VCLF	Virginia Land Conservation Foundation
VMNH	Virginia Museum of Natural History
VOF	Virginia Outdoors Foundation
VPA	Virginia Port Authority
VPISU	VA Polytechnic Institute & State University
VRA	Virginia Resources Authority

INTRODUCTION

This annual report provides an overview of (1) status and trends information related to the environmental health of Virginia's Chesapeake Bay and its Bay tributaries; (2) the implementation of the Chesapeake Bay agreement (*Chesapeake 2000: A Watershed Partnership*), and (3) the evolution and implementation of strategies to reduce the flow of nutrients and sediments into Virginia's Chesapeake Bay tributaries and the Virginia portion of the Bay.

The report serves a number of interrelated functions with the principal ones being to provide general accountability for a large, complex and ongoing environmental protection and restoration effort, provide a comprehensive summary of that effort to facilitate management review and guidance, and meet state statutory reporting requirements.

Regarding the last point this report is in response to two related requirements found in the Code of Virginia:

- Title 2.2, Chapter 2, Section 220 - calls for an annual report on progress being made in the development and implementation of nutrient reduction strategies for Virginia's tributaries to the Chesapeake Bay.
- Title 2.2, Chapter 2, Section 220.1 - calls for an annual report on the progress being made by the Commonwealth in achieving a 40% reduction of nutrients flowing into the Bay and its tributaries, and on the status of all of Virginia's commitments under the 2000 Bay agreement.

PART ONE
Environmental Status and Trends Information

I. INTRODUCTION AND OVERVIEW

This section presents information about key ecological conditions in the tidal portions of the Virginia Chesapeake Bay, and its major tributaries (i.e., Potomac, Rappahannock, James, and York Rivers). The water quality conditions discussed are directly affected by the nutrient and sediment reduction strategies.

These water quality conditions are represented by a combination of the current status and long-term trends for nutrients (nitrogen and phosphorus), chlorophyll, water clarity, suspended solids, and dissolved oxygen. Environmental information regarding other important conditions in Chesapeake Bay (e.g., submerged aquatic vegetation, fisheries, chemical contaminants) has been reported previously in "*Chesapeake Bay and its Tributaries: Results of Monitoring Programs And Status of Resources; 2002 Biennial Report of the Secretary of Natural Resources to The Virginia General Assembly"* (available online at http://www.deq.state.va.us/bay/wqifdown.html). There is also current environmental information in a recently published document entitled, "*The State of the Chesapeake Bay: A Report to the Citizens of the Bay Region, CBP/TRS 260/02, July 2002*" (available online at http://www.chesapeakebay.net/pubs/sob/index.cfm).

The Virginia Chesapeake Bay and its tidal tributaries continue to show some environmental trends indicating progress toward restoration of a more balanced and healthy ecosystem. However, the Bay system remains degraded and some areas and indicators show continuing degradation. Progress in reducing nutrient inputs has made demonstrable improvements and we expect that continued progress toward nutrient reduction goals, along with appropriate fisheries management and chemical contaminant controls, will result in additional improvements to the Bay. Findings from the last 17 years of the monitoring programs are highlighted below and discussed further in the following sections.

- Overall, in Virginia's portion of the Chesapeake Bay drainage area, the 2001 annual nutrient loads discharged by point sources were reduced by 57% for phosphorus and 25% for nitrogen, compared to the 1985 baseline loads. These are minor decreases in loads compared to 2000, and likely resulted from a 6% decrease in the amount of treated discharge from the facilities tracked. This decrease in discharge may be partly due to ongoing drought conditions in Virginia.

- Estimates of controllable and uncontrollable nonpoint source loads of phosphorus, nitrogen, and sediment as calculated by the Bay Program Watershed Model have decreased by 7%, 9%, and 11%, respectively, as compared to 1985 levels.

- Nutrient loadings calculated from in-stream concentrations at watershed input monitoring stations are affected by these reduced point and non-point inputs but are highly dependant on river flow volumes as well. There have been no reductions in these in-stream nutrient and sediment loads into the Virginia tidal tributaries except in the James River, where nitrogen loads have decreased.

- Phosphorus levels in water entering the Bay from the watershed are reflecting both point and nonpoint source nutrient source reductions by showing improving trends in some areas over

the last 17 years. Within the tidal waters themselves, there is also some improving trends observed but many degrading trends. Overall, there were twelve areas showing improving trends and nineteen areas showing degrading trends for phosphorus.

- For nitrogen, the Potomac is the only major river in Virginia that showed improving trends in water entering from its watershed. Nitrogen levels showed improving trends in much of the tidal Potomac and Elizabeth Rivers. Degrading trends occurred in much of the tidal York and lower James. Overall, there were nine areas showing improving trends and ten areas showing degrading trends for nitrogen.

- Because of improvements made in analytical techniques instituted in 1995, a second set of trend analyses were conducted on data from 1995 through the present, in order to use the most consistent data record. Both phosphorus and nitrogen show many improving conditions throughout the Virginia Chesapeake Bay when these most recent seven years are examined. These improvements are probably related to the management actions to reduce nutrient inputs as well as the generally decreased river flow that has occurred in recent years.

- Chlorophyll concentrations (an indicator of algae levels) are moderately high throughout much of the tidal waters. Degrading trends were widespread geographically and indicative of detrimentally high nutrient levels. Overall, nine areas showed degrading trends in chlorophyll while only one area showed an improving trend.

- Levels of dissolved oxygen are improving in geographically widespread areas of the tidal rivers. However, conditions for dissolved oxygen still remain only fair in much of the Virginia Chesapeake Bay and a few of the river segments near the Bay. The Corrotoman River and Tangier Sound are the only areas with degrading trends in dissolved oxygen. Overall, there were thirteen areas showing improving trends and two areas showing degrading trends for dissolved oxygen conditions.

- Water clarity, a very important environmental parameter, was generally poor and degrading trends were detected in many areas near and in the Virginia Chesapeake Bay. This is probably related to high and scattered increasing levels of suspended solids. These degrading conditions in the Virginia Chesapeake Bay may result in degradation of zooplankton populations and are a major impediment to restoration of submerged aquatic vegetation (SAV). Overall, there were no areas showing improving trends and thirteen areas showing degrading trends in water clarity.

II. TRIBUTARY BASIN NUTRIENT LOADS

A. Point Sources

Table II-1 presents the calendar year 2001 total annual nitrogen and phosphorus loads discharged from the significant point sources into each of Virginia's Bay tributary basins. The table also shows the percent change in loads from 1985 to 2001.

Overall, between 1985 and 2001, the annual point source nutrient loads discharged into Virginia's Bay watershed have been reduced by 57% for phosphorus, and 25% for nitrogen. Point source loadings of nitrogen and phosphorus decreased by 1% (30,600 lbs./yr.) and 2% (423,400 lbs./yr.), respectively, from 2000 to 2001. These modest changes likely resulted from a 6% decrease in the

amount of treated discharge from the facilities monitored (from 855 million gallons per day in 2000, to 805 MGD in 2001), and minor additions/deletions to the list of plants included in the loading estimate. The drop in discharge flow, which occurred primarily at municipal plants in the James River, may be partly due to reduced infiltration and inflow into sewer systems caused by ongoing drought conditions in Virginia.

Steady progress has been maintained in reducing point source phosphorus loads as a result of the 1988 phosphate detergent ban and the introduction of phosphorus control systems at all the major plants discharging to the tidal portions of the Bay tributaries. The nitrogen reduction effort was aided in 2001 with the start-up of biological nutrient removal (BNR) systems at two plants. Using grants from the Water Quality Improvement Fund (WQIF), two BNR projects were initiated in the Potomac River basin, one at the Leesburg STP and the other at the Staunton-Middle River STP. Significant additional reductions should occur with the implementation of the remaining Potomac WQIF projects that are to be completed in 2002 and 2003, especially the large plants in northern Virginia. Future point source reductions will result from the completion of an additional eight WQIF projects in the lower Bay tributaries.

Appendix C contains the 2001 nutrient loads for the significant point source dischargers tracked in each river basin in Virginia's portion of the Chesapeake Bay watershed. Plants are sorted by the percent reduction achieved since the baseline year (1985), with those achieving the highest reduction levels at the top of each list.

Table II-1. Virginia Point Source Nutrient Loads – 2001

River Basin	Number Of Plants	2001 Phosphorus Load (lbs/yr)	Phosphorus % Change from 1985	2001 Nitrogen Load (lbs/yr)	Nitrogen % Change from 1985
Shen/Potomac	40	552,680	-28%	11,739,300	+8%
Rappahannock	14	48,070	-74%	543,690	+11%
York	9	182,600	-59%	1,103,460	-20%
James	30	1,363,240	-62%	13,504,040	-44%
Coastal	8	146,260	-56%	1,818,360	+40%
Totals	**101**	**2,292,850**	**-57%**	**28,708,850**	**-25%**

B. NonPoint Sources

Table II-2 presents the total annual phosphorus, nitrogen and sediment loads from nonpoint sources in each of Virginia's tributary basins. The table also shows the percent change in loads when compared to the 1985 baseline. The loading estimates are results based on the Year 2000 Progress Run of Phase 4.3 of the Chesapeake Bay Watershed Model and calculated reductions for calendar year 2001 Best Management Practices (BMPs). This progress estimate accounts for implementation of all nonpoint source BMPs tracked by the Department of Conservation and Recreation.

Table II-2. Virginia Nonpoint Source Nutrient Loads – 2001

River Basin	2001 Phosphorus Load (lbs/yr)	Phosphorus % Change from 1985	2001 Nitrogen Load (lbs/yr)	Nitrogen % Change from 1985	2001 Sediment Load (tons/yr)	Sediment % Change from 1985
Shen/Potomac	1,648,960	-10.5%	13,873,110	-10.1%	717,220	-13.4%
Rappahannock	872,370	-19.5%	7,419,910	-19.9%	328,280	-21.4%
York	653,950	-13.4%	6,796,740	-13.3%	139,080	-12.2%
James	4,482,550	- 0.8%	22,696,690	- 2.7%	1,197,020	- 5.4%
Coastal	194,250	-14.2%	2,075,320	- 5.0%	19,380	-17.2%
Totals	**7,852,080**	**- 6.8%**	**52,861,770**	**- 8.9%**	**2,400,980**	**-10.8%**

III. Water Quality

Monitoring of water quality conditions is vital to understanding environmental problems, developing strategies for managing the Bay's resources, and assessing progress of management practices. This section summarizes results of statistical analyses conducted on surface concentrations of total nitrogen, total phosphorus, chlorophyll, water clarity, total suspended solids and bottom measurements of dissolved oxygen. These parameters are measures of water quality directly influenced by changes in nutrient loading and that in turn directly affect living resources of the Bay.

Nutrients such as nitrogen and phosphorus influence the growth of phytoplankton in the water column. Elevated concentrations of these nutrients can result in excessive phytoplankton production (i.e., algal growth rate). Decomposition of the resulting excess organic material during the summer can result in low levels of dissolved oxygen in bottom waters. These low oxygen levels (anoxic or hypoxic events) can cause fish kills and drastic declines in benthic communities which are the food base for many fish populations. Anoxic waters also adversely affect fish and crab population levels by limiting the physical area (habitat) where these organisms can live.

The terms *good*, *fair*, and *poor* used in conjunction with nitrogen and phosphorus conditions are statistically determined classifications for comparison among areas of similar salinity within the Chesapeake Bay system. Though useful in comparing current conditions among different areas of the Chesapeake Bay system, it must be remembered that these terms are not absolute evaluations but only appraisals relative to other areas of a generally degraded system. Several major scientific studies have shown that the Chesapeake Bay system is currently nutrient enriched and has excessive and detrimental levels of nutrient and sediment pollution. Given this, it is likely that an absolute evaluation in relation to ideal conditions would indicate that most water quality parameters are currently poor throughout the whole Bay system.

The Monitoring Subcommittee of the Federal-Interstate Chesapeake Bay Program continues to develop additional methodologies for water quality status evaluations, which in the future will be used in conjunction with, or possibly in replacement of, the current methods.

Phosphorus: Figure 1 presents the current status and long term trends (1985-2001) in phosphorus concentrations. Areas of the **Elizabeth,** lower **James,** and **York** have the poorest conditions in relation to the rest of the Chesapeake Bay system. Other furthest downstream segments of rivers are fair but the mainstem **Virginia Chesapeake Bay** and the upper portions of the tidal rivers have relatively good conditions.

The "watershed input" stations shown in Figure 1 provide information about the success of nutrient control efforts. Results at these watershed input stations (measurements taken at the fall line) are flow-adjusted in order to remove the effects of river flow and assess only the effect of nutrient management actions (e.g., point source discharge treatment improvements and BMPs to reduce non-point source runoff). Patterns observed in the flow-adjusted trends at these stations often seem to contradict trend results observed at stations in the tidal portions of a given river where flow-adjustment is not performed. For example, trends at the Rappahannock River input station show an improving trend in phosphorus while degrading trends were observed in the tidal portion of the same river (Figure 1). This occurs because trends in tidal areas result from many factors in addition to total nutrient loads at the fall line, such as: nutrient loadings from land areas adjacent to tidal waters, nutrient loads from the Mainstem Chesapeake Bay associated with salt-water intrusion, instream and shoreline erosion and resuspension; and in-stream biogeochemical

nutrient cycling. For the example cited, the results suggest that management actions taken above the fall line have been effective in improving phosphorus concentrations at the watershed input station but as a result of some combination of the factors listed above, these improvements were not reflected in changes of downstream concentrations of phosphorus.

The watershed input stations in the largest Virginia tributaries (**James and Rappahannock**) and one of the York branches (**Mattaponi**) showed improving "flow-adjusted" concentration trends (i.e., decreasing phosphorus). However, no trends in phosphorus loads calculated from in-stream concentrations have been detected in any of the Virginia tributaries. These loads are highly dependent on river flow and despite a three year drought there have been no significant trends in river flow over the last 17 years. This suggests that the improving flow-adjusted trends may be the result of the phosphate detergent ban, as well as implementation of BMPs for the control of non-point sediment and nutrient runoff. A degrading trend in phosphorus was detected in the **Pamunkey**, suggesting management efforts to control phosphorus runoff have not been as effective in this basin. A disconcerting trend noted this year was the degrading flow-adjusted trends in phosphorus concentrations at the Potomac River watershed input station.

Improvements in phosphorus trends at the watershed input stations did not appear to have widespread positive effects on phosphorus concentrations in tidal waters. Although degrading trends in phosphorus were detected in many tidal areas, improving trends were detected in the **Elizabeth River**, **Potomac River**, upper **James River,** and **Tangier Sound**.

Figure 1b presents the trends in phosphorus concentrations since 1995 (see adjacent text box). These show encouraging recent improvements in conditions throughout the **Virginia Chesapeake Bay**. These improvements may be related to the management actions to reduce nutrient inputs as well as the generally decreased riverflow that has occurred in recent years.

Nitrogen: Figure 2 presents status and long term trends (1985-2001) in nitrogen concentrations. As with phosphorus, management actions to reduce nitrogen have been effective as indicated by improving trends at the **Potomac River** and **Mattaponi River** watershed input stations. However, as with phosphorus, flow-adjusted concentrations of nitrogen are degrading in the **Pamunkey River**.

Total loadings of nitrogen, as calculated from in-stream concentrations, at the watershed input stations has remained relatively unchanged in all rivers except the **James River**, where it has declined. This loading reduction may be the result of the declining nitrogen concentrations resulting from management actions, since river flow volume has not shown any concurrent trend.

An improving trend in in-stream concentrations of nitrogen at the watershed input station was detected in the **Potomac River** and may have resulted in improving trends in several tidal areas of that river. As with phosphorus, the **Elizabeth River** has shown widespread improving trends in nitrogen also. The tidal **York River** and downstream sections of the **James River** had widespread degrading trends in nitrogen.

Status in the upper **Potomac River** and parts of the **Elizabeth River** is worse than status in the other major tributaries (**Rappahannock**, **York**, and **James**) and the **Virginia Chesapeake Bay**. Much of the **Rappahannock River**, **York River**, and **James River,** and **Virginia Chesapeake Bay** have good relative status.

Figure 2b presents the trends in nitrogen concentrations since 1995. As with phosphorus, these show encouraging recent improvements in conditions throughout the **Virginia Chesapeake Bay,** as well as the disappearance of many degrading trends present in the long-term data set (Figure 2). These improvements may be related to the management actions to reduce nutrient inputs, in addition to the decrease in river flow that has occurred in the last three years under drought conditions.

Nutrient Trends

Improved tributary data collection procedures for nitrogen and phosphorus were implemented in 1995. In brief, direct measurement of particulate fractions was begun, less sensitive analyses discontinued (e.g., Kjeldahl digestion), and new lab instrumentation procured to lower detection levels. The following new trend analysis protocols were used this year to account for these changes:

- The 17 year trends of figures 1 and 2 utilized a multiple regression model with a "dummy' variable to account for the method change. The adjusted output is then analyzed with a seasonal Kendall test. This protocol is different than that used in previous progress reports for these parameters.
- In order to examine the most consistent and highest quality data record available, we present only the trends since the method changes were implemented (i.e., since 1995) in figures 1a and 1b. These trends are data analyzed with a seasonal Kendall test. This trend test is the same as previous progress reports for these parameters and the same as used for the other parameters discussed (i.e., solids, water clarity, dissolved oxygen, and chlorophyll).

Chlorophyll: Chlorophyll is a measure of the level of algal biomass (i.e., phytoplankton) in the water. High chlorophyll or algal levels are an indicator of poor water quality because they can lead to low dissolved oxygen conditions when their organic material sinks into bottom waters and is decomposed. High algal levels can also be a factor in reduced water clarity which decreases available light required to support photosynthesis in Submerged Aquatic Vegetation (SAV). High algal levels also can be indicative of problems with the food web such as decreased food quality for planktonic feeding fish (e.g., menhaden) and shellfish (e.g., oysters). Finally, high levels of chlorophyll may be indicative large-scale blooms of toxic or nuisance forms of algae.

Figure 3 presents the current status and long term trends (1985-2001) in chlorophyll concentrations. In parts of most of the major Virginia tributaries, chlorophyll concentrations were at levels considered to be borderline with respect to the criterion for growth of submerged

aquatic vegetation (SAV). In the Appomattox and Chickahominy rivers, which are important SAV growth areas, concentrations of chlorophyll exceeded the criterion for SAV growth.

Degrading trends in chlorophyll were detected in at least one segment of each of the Virginia tributaries and the Chesapeake Bay Mainstem except for the Elizabeth River where an improving trend was detected. Much of the York River system (i.e., lower **Mattaponi**, lower **Pamunkey**, and upper **York**) may be of particular concern since three segments in close proximity; the lower **Mattaponi River**, the lower **Pamunkey River** and the upper **York River**, had degrading trends in chlorophyll in combination with degrading trends in both nitrogen and phosphorus. This indicates that additional improvements in nitrogen and phosphorus concentrations will be required before improvements in chlorophyll concentrations can be expected. Of additional concern was the appearance of a degrading trend in the upper James River segment for the first time since annual reporting began.

Dissolved Oxygen: Bottom dissolved oxygen is an important factor affecting the survival, distribution, and productivity of living resources in the aquatic environment. Figure 4 presents the current status and long term trends (1985-2001) in dissolved oxygen concentrations. Status of each segment is given in relation to dissolved oxygen levels supportive of living resources. About half of the Virginia Chesapeake Bay and smaller portions of the tidal tributaries had only fair status. The lower **Potomac River**, lower **Rappahannock River**, lower **York River**, and northernmost **Virginia Chesapeake Bay** segments are indicated as poor or fair, partly because of low dissolved oxygen concentrations found in the mid-channel trenches. These mid-channel trenches have naturally lower dissolved oxygen levels and the spatial and temporal extent of low dissolved oxygen levels has been exacerbated by anthropogenic nutrient inputs. Despite the widespread problems, new improving trends in dissolved oxygen have been detected each year and persisted over several years. Improving trends have now been reported in the **Potomac**, **Rappahannock**, **James**, and **Elizabeth** rivers. The only degrading trends were in the **Corrotoman River** and **Tangier Sound**.

Water Clarity: Water clarity is a measure of the depth to which sunlight penetrates through the water column. Poor water clarity is an indication that conditions are inadequate for the growth and maintenance of submerged aquatic vegetation (SAV). Poor water clarity can also affect the health and distributions of fish populations by reducing their ability to capture prey or avoid predators. The major factors that affect water clarity include: 1) concentrations of particulate inorganic mineral particles (i.e., sand, silt and clays), 2) concentrations of planktonic algae (i.e., phytoplankton), 3) concentrations of particulate organic detritus (small particles of dead algae and/or decaying marsh grasses), and 4) dissolved substances which "color" the water (e.g., brown humic acids generated by plant decay). Which of these factors most readily influence water clarity varies both seasonally and spatially.

Figure 5 presents the current status and long term trends (1985-2001) in water clarity. Status of water clarity is assessed relative to a criterion devised to indicate whether or not a given area can support the growth of SAV. Status of many segments within the tributaries and the Chesapeake Bay mainstem was borderline or failed to meet the SAV water clarity goals. This suggests that poor water clarity is one of the major environmental factors inhibiting the resurgence of SAV growth in Chesapeake Bay.

Degrading trends in water clarity were detected in segments located over a wide geographic area within the Virginia tributaries and **Virginia Chesapeake Bay**. These degrading trends represent a substantial impediment to the recovery of SAV beds within Chesapeake Bay. Possible causes of the degrading trends included increased shoreline erosion as a result of waterside development,

loss of wetlands, increased abundance of phytoplankton, or a combination of sea level rise and land subsistence.

Suspended Solids: Suspended solids are a measure of particulates in the water column including inorganic mineral particles, planktonic organisms and detritus which directly controls water clarity for SAV. Elevated suspended solids can also be detrimental to the survival of oysters and other aquatic animals. Young oysters can be smothered by deposition of material and the feeding of filter feeding fish such as menhaden can be negatively affected by high concentrations of suspended solids. In addition, since suspended solids is comprised of organic and mineral particles that contain nitrogen and phosphorus or to which nitrogen and phosphorus compounds are adsorbed, increases in suspended solids can result in an increase of nutrient concentrations.

Figure 6 presents the current status and long term trends (1985-2001) in suspended solids concentrations. All of the major Virginia tributaries have segments that fail or are borderline in relation to targets to support growth of SAV. Improving trends in flow-adjusted concentrations at the watershed input stations of the **Potomac River** and the upper **Mattaponi River** suggest that management actions to reduce NPS sediment loads may be working. However, several degrading trends in suspended solids concentrations were detected in some segments in both the tributaries and the **Virginia Chesapeake Bay Mainstem**. Previously detected degrading trends in Tangier Sound are no longer present. This improvement may be crucial to the recovery of the SAV beds found in this area.

Figure 1) Total Phosphorus Status and Trends

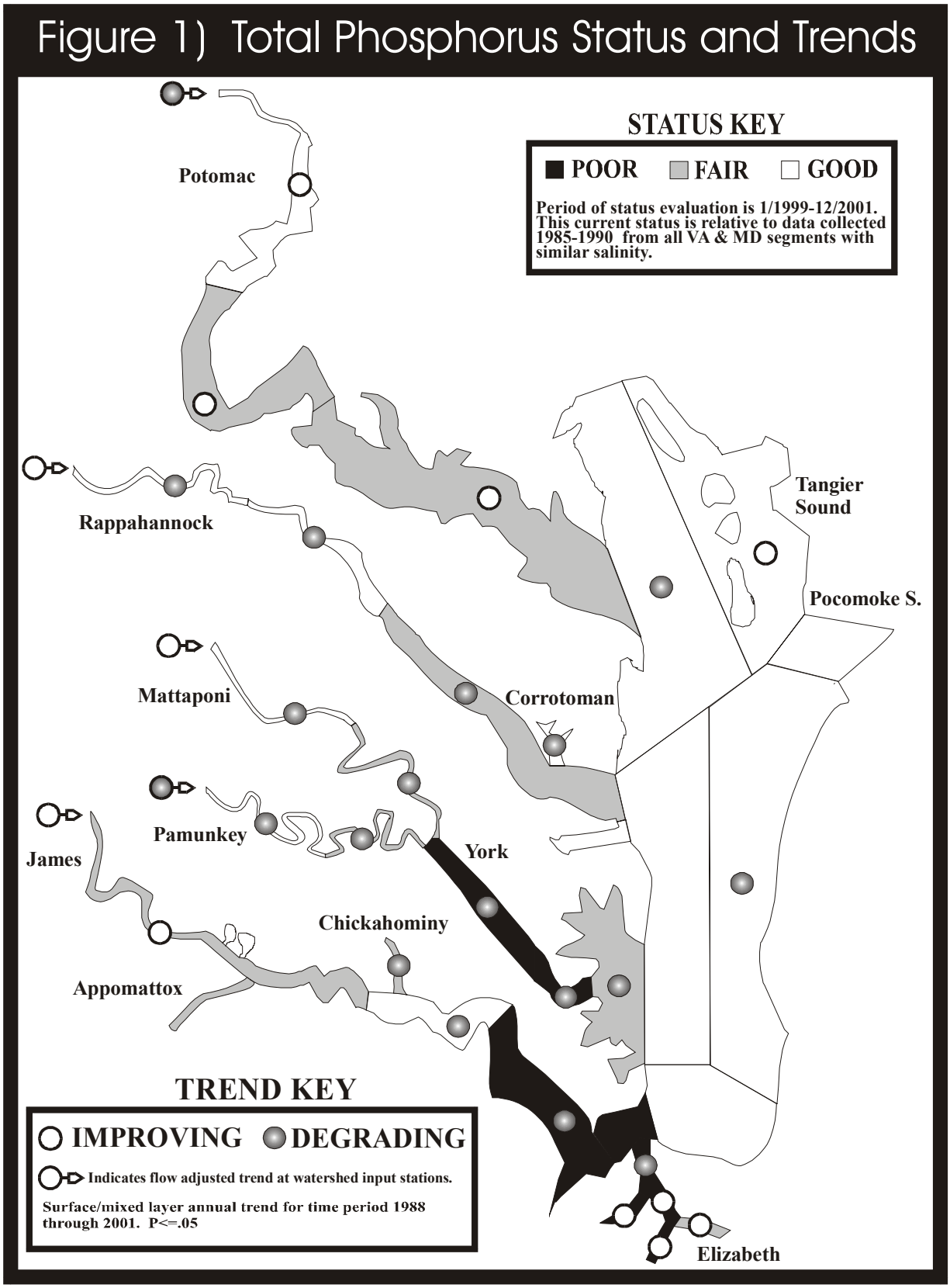


Figure 1b) Total Phosphorus Trends Since 1995

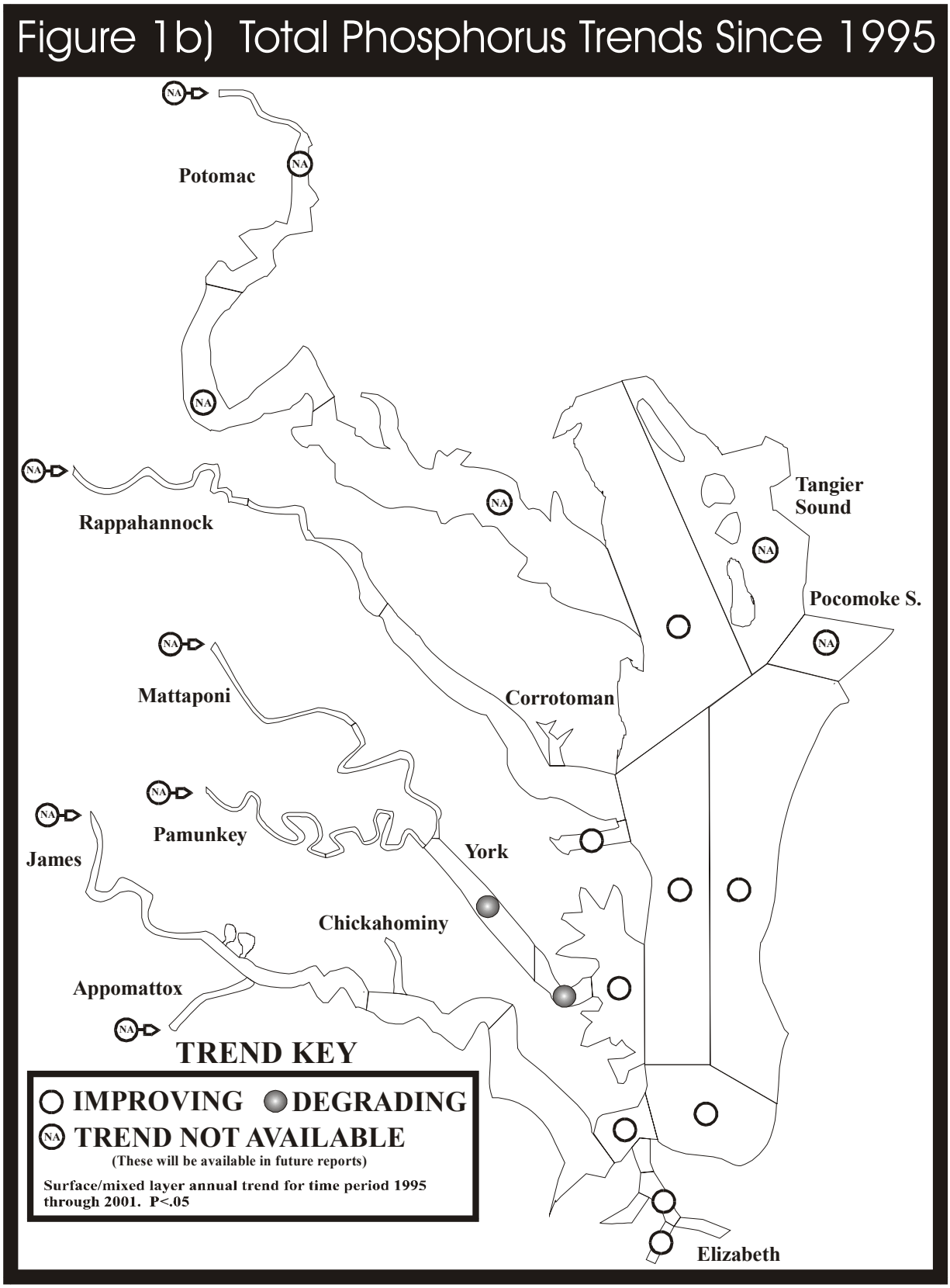


Figure 2) Total Nitrogen Status and Trends

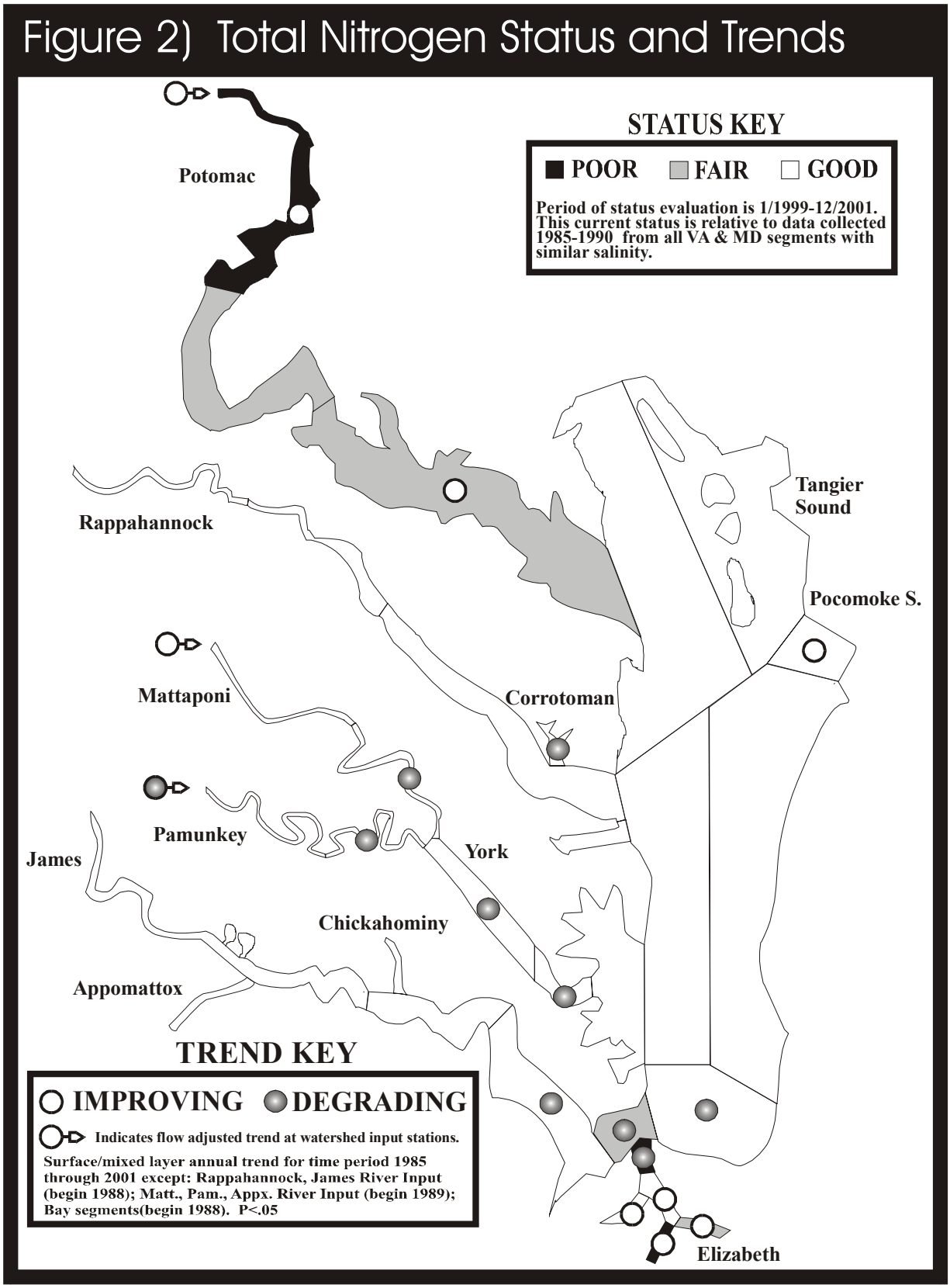


Figure 2b) Total Nitrogen Trends Since 1995

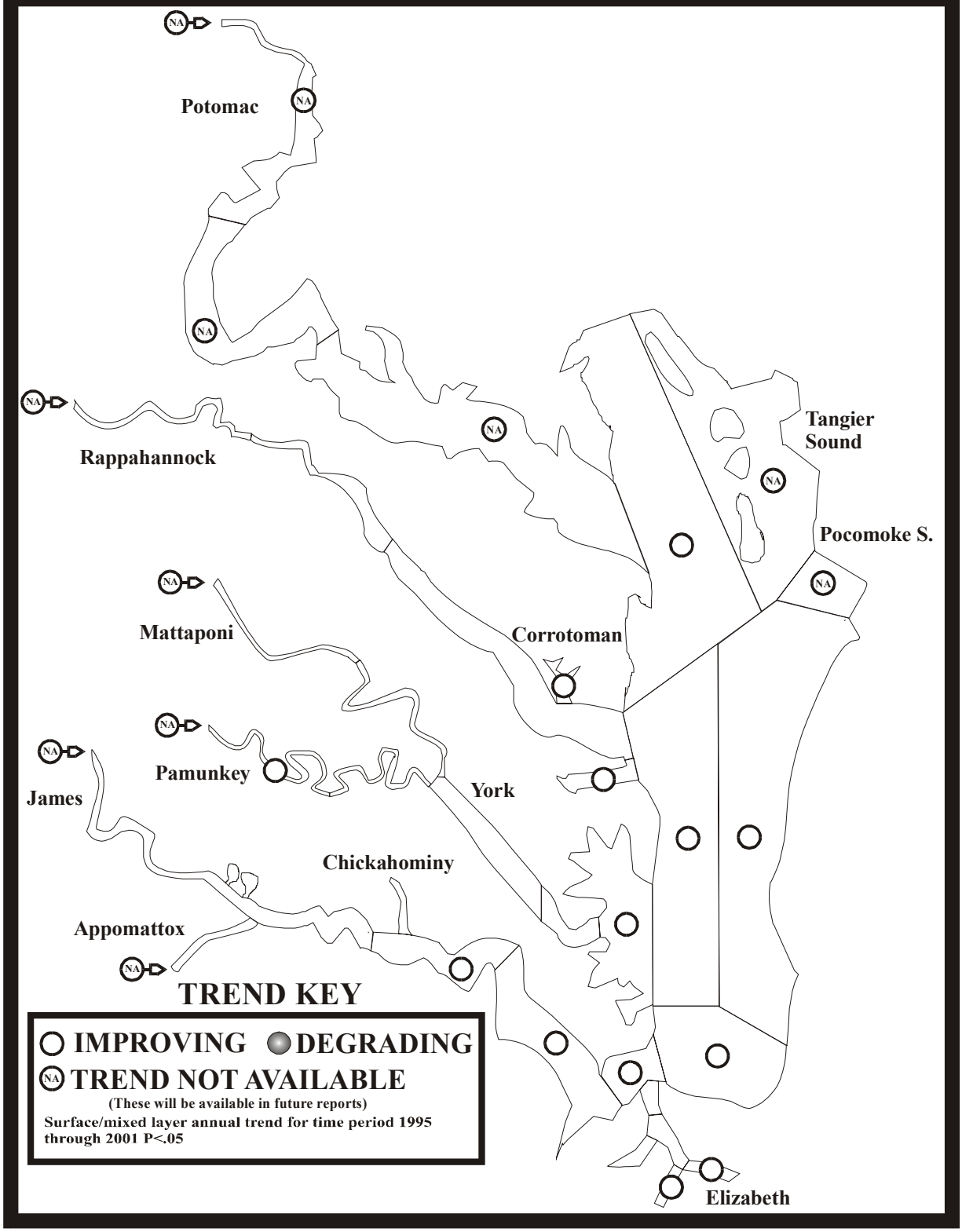


Figure 3) Chlorophyll Status and Trends

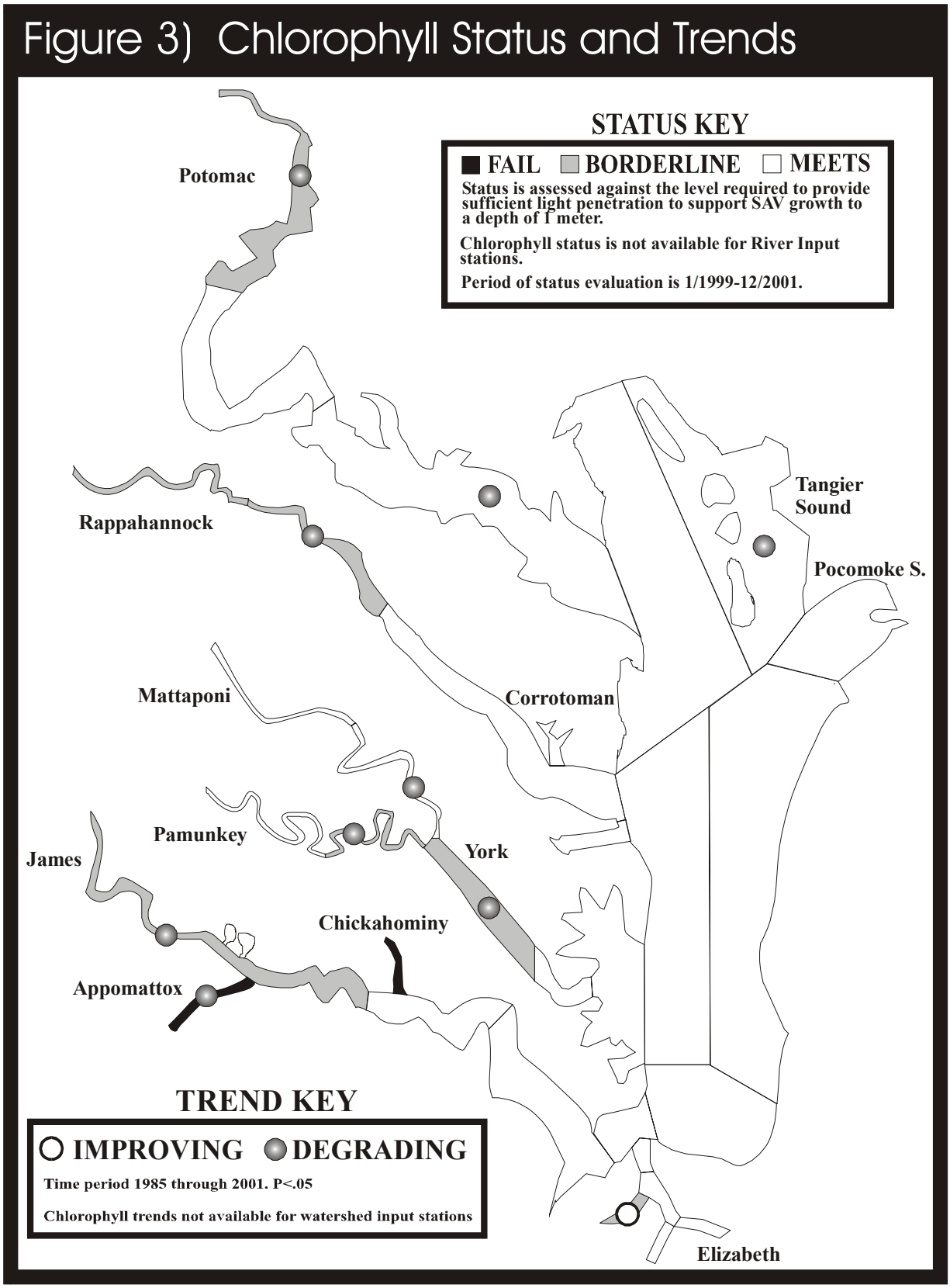


Figure 4) Dissolved Oxygen Status and Trends

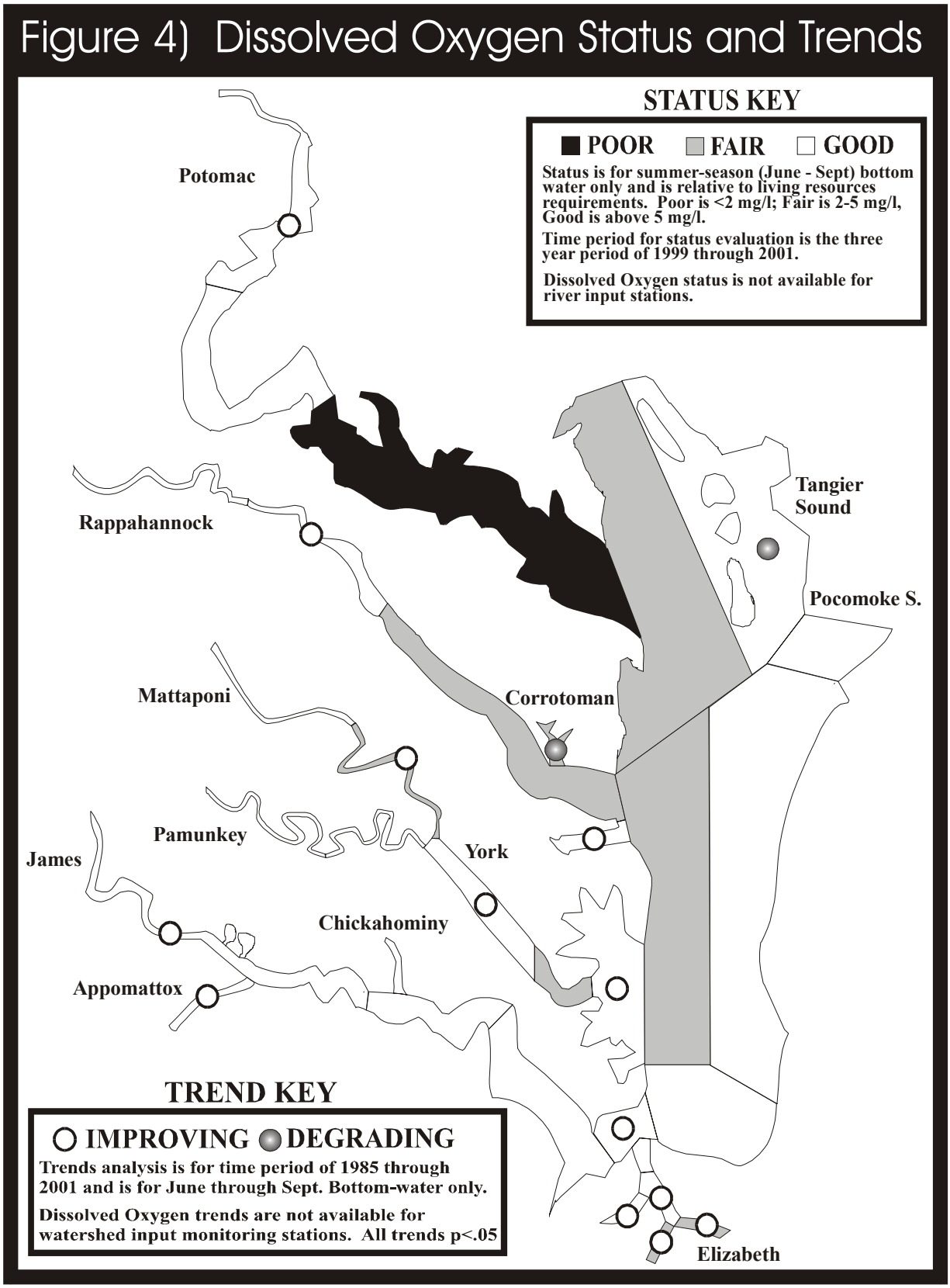


Figure 5) Water Clarity Status and Trends

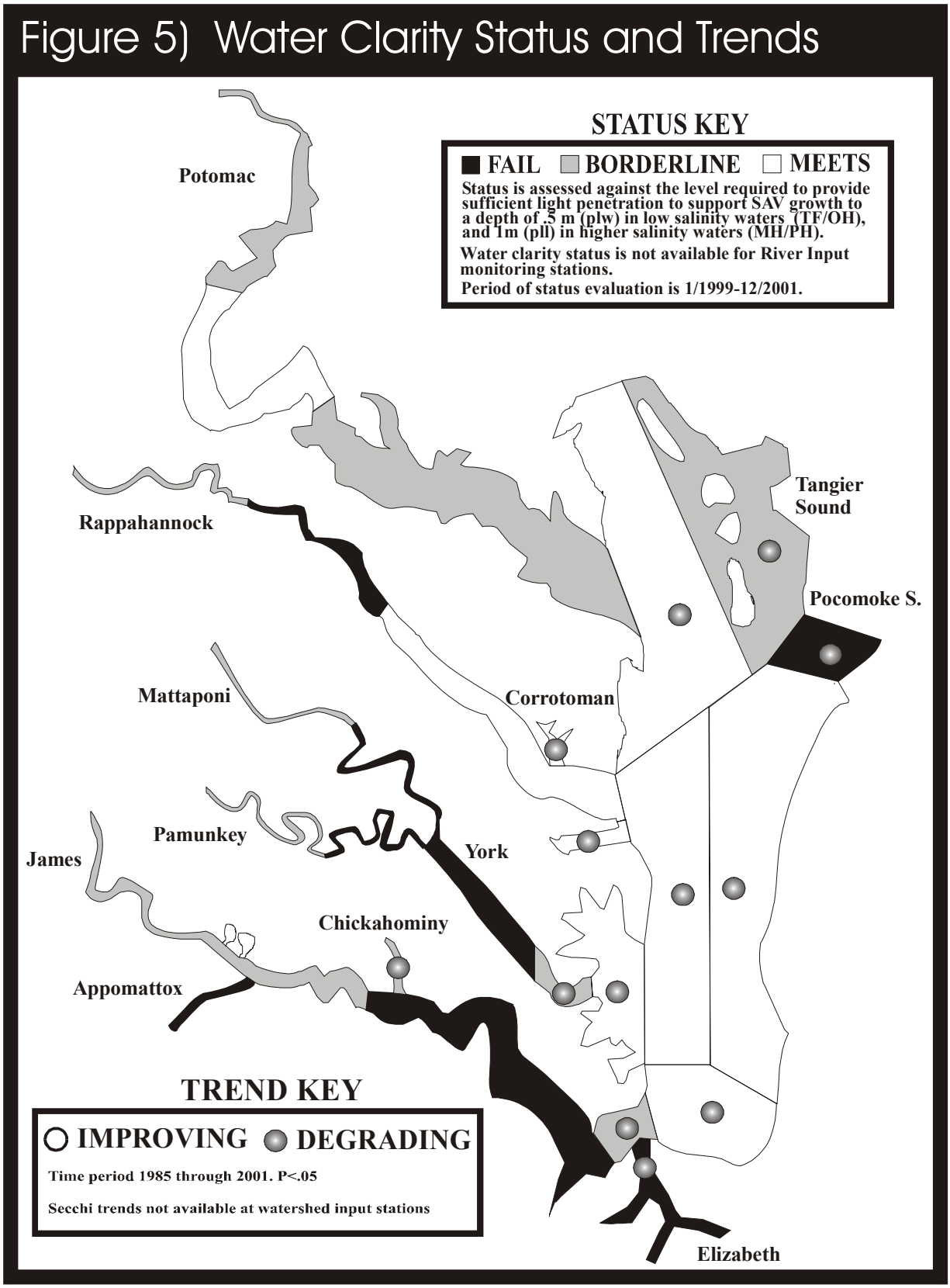
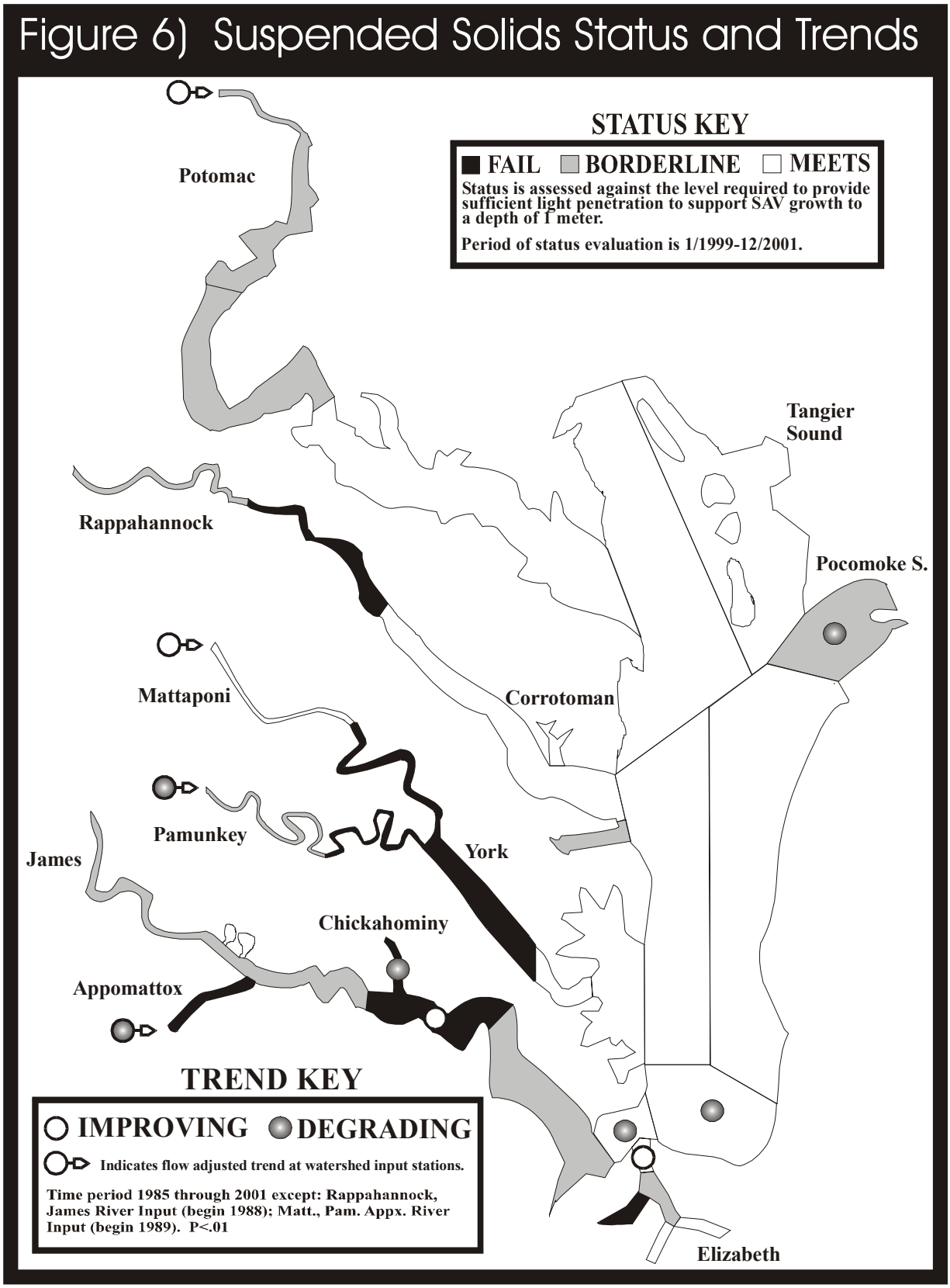


Figure 6) Suspended Solids Status and Trends

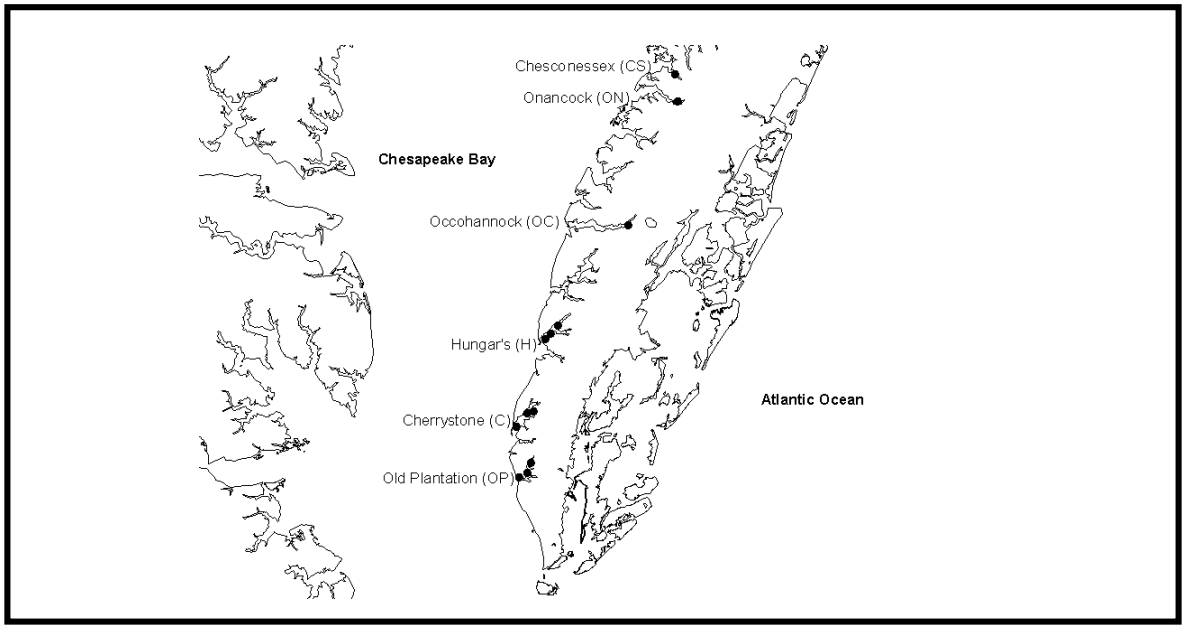


The remainder of this section describes water quality on the **Eastern Shore**. Streams on Virginia's Eastern Shore are primarily composed of relatively shallow bayside inlets that are tidally well mixed with Bay water and many of which have small tidal creek systems associated with them. Relatively little water quality data exists for the tidal waters of the Eastern Shore in comparison to the major western shore tidal waters (i.e., Potomac, James, York and Rappahannock Rivers).

The 1999 Eastern Shore Coastal Basins Tributary Strategy identified two main goals: to reduce nitrogen 22.4%, phosphorus 41.8% and sediment 31.4% by 2003 and to increase the areas and density of submerged aquatic vegetation (SAV) to historic levels throughout the Eastern Shore tidal creeks and embayments. A key component to meeting those goals was establishing a baseline for nutrient budgets through an enhanced water quality monitoring program.

Between January 2001 and June 2002 the Virginia Institute of Marine Science and the Alliance for the Chesapeake Bay conducted a cooperative study in conjunction with Virginia's Eastern Shore Watersheds Network to collect water clarity and nutrient data from six creeks along the Eastern Shore (Figure 1). Three creeks are located in Northampton County (Cherrystone Inlet, Hungar's Creek and Old Plantation Creek), two creeks are located in Accomack County (Chesconessex Creek and Onancock Creek), and the Occohannock Creek flows through both counties. Additionally, water quality was monitored in several wells in Northampton County.

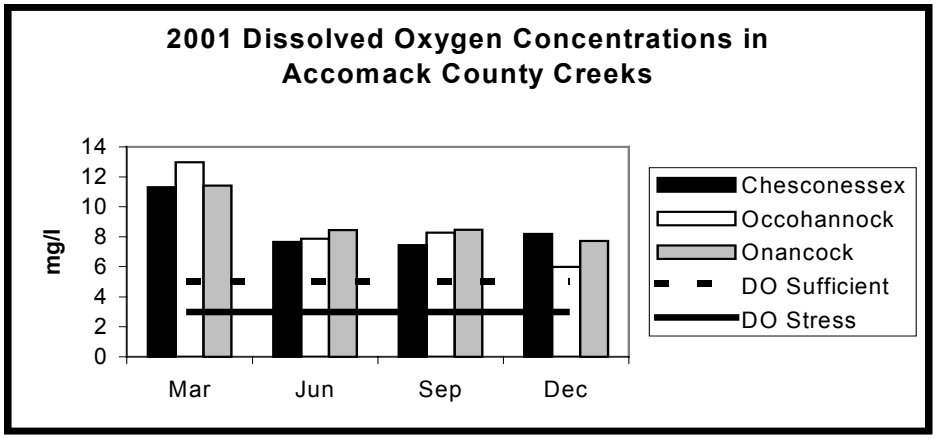
Figure 1. Sampling Locations for Eastern Shore Water Quality Study 2001-2002.



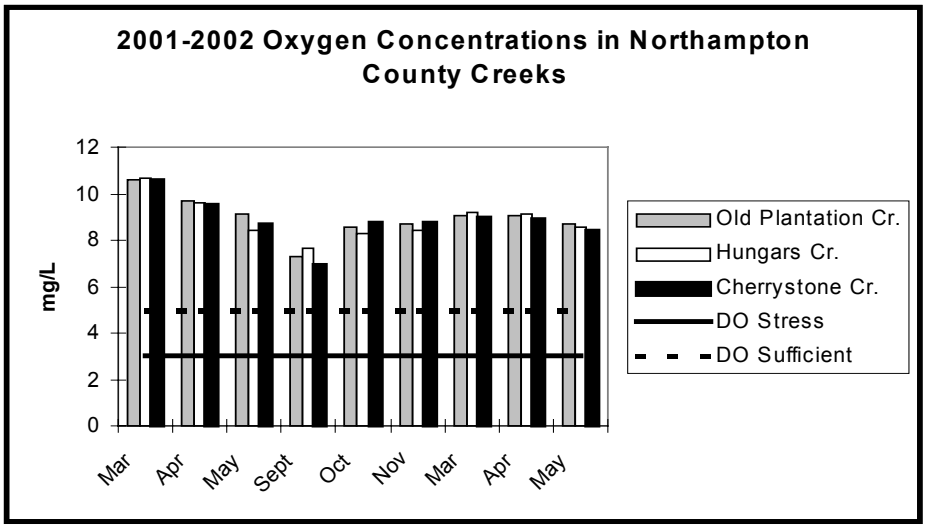
Oxygen: Oxygen concentrations for the three Accomack County creeks (includes the Occohannock Creek) are shown in Figure 2a and for the Northampton Creeks in Figure 2b. Oxygen levels were well above those considered stressful to aquatic life and

remained above the water quality criteria of 5 mg/L on all creeks in 2001 and in the Northampton County creeks during 2002.

a.



b.



a. Dissolved Oxygen in Accomack County creeks including Occohannock Creek for 2001.
b. Northampton County Creeks 2001-2002. Dissolved Oxygen concentrations in Northampton County Creeks are averages for results obtained biweekly from sites located at the mouth, midstream and upstream of each creek. Only averages for months critical for Submerged Aquatic Vegetation growth in polyhaline environments are shown (i.e. May-March and September-November).

Figure 2. Oxygen concentrations

Nitrogen and Phosphorus: Water quality criteria requirements for one-meter restoration of submerged aquatic vegetation (SAV) were met for nitrogen (Figure 3) and phosphorus (Figure 4) on all creeks.

Figure 3. Nitrogen Concentrations 2001-2002.
Average concentrations during SAV growth season (May - March and September - November) based on replicated results from a single site and monthly sampling for the Chesconessex, Occohannock and Onancock Creeks and for replicated results from three sites and bi-weekly sampling for Cherrystone Inlet, Hungar's Creek and Old Plantation Creek. Dissolved Inorganic Nitrogen criteria in mg/l (Batiuk et. al. 2000. Submerged Aquatic Vegetation Water Quality and Habitat - Based Requirements and Restoration Targets: A Second Technical Synthesis. Chesapeake Bay Program, Annapolis, Maryland).

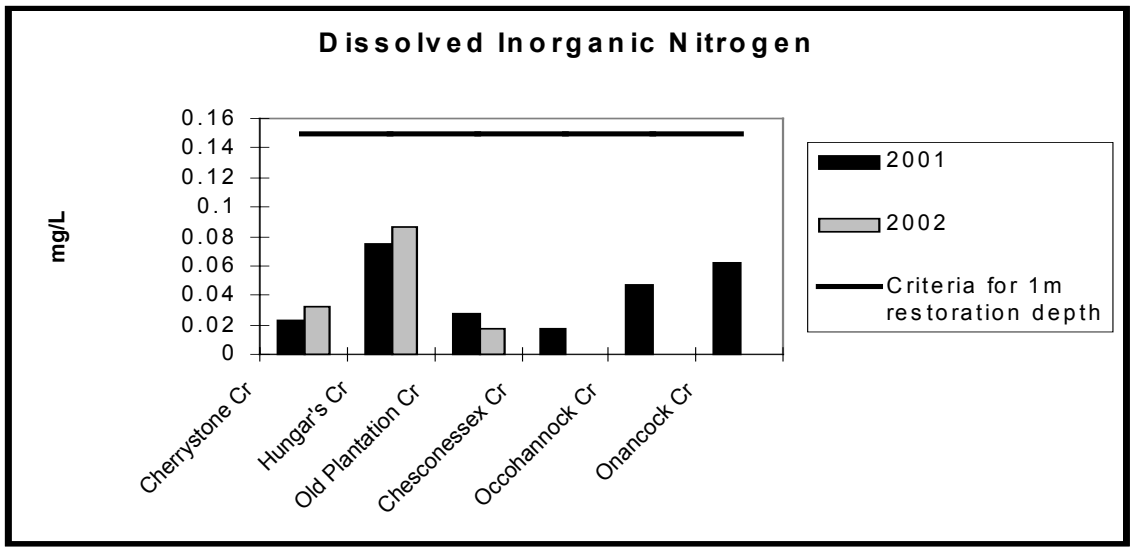
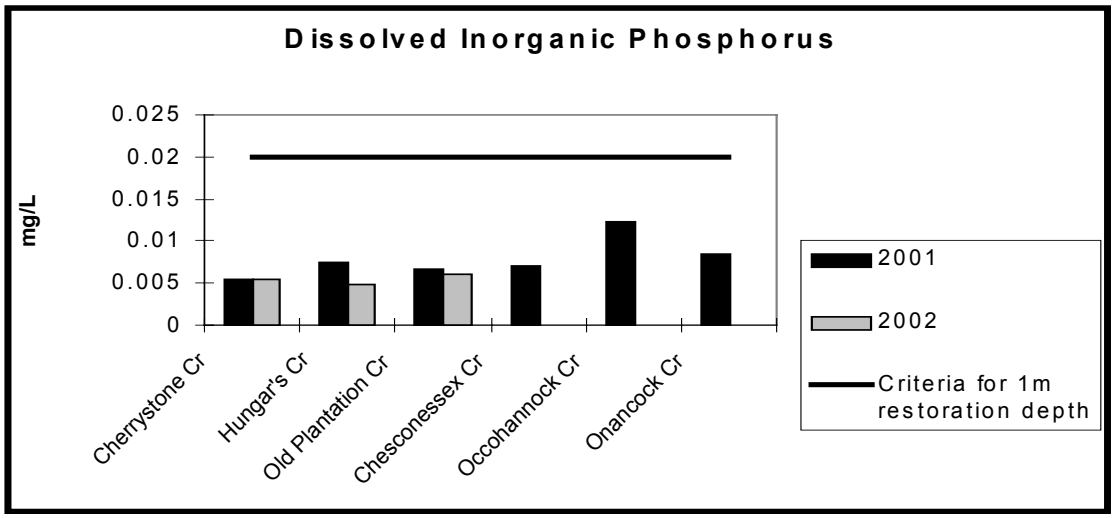
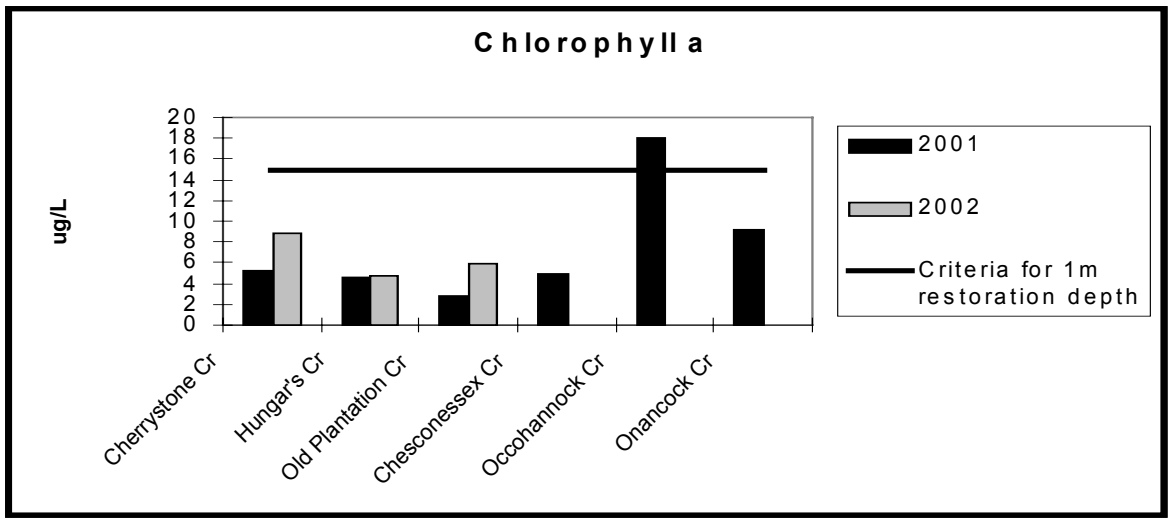


Figure 4. Phosphorus Concentrations 2001-2002.
Average concentrations during SAV growth season (May - March and September - November) based on replicated results from a single site and monthly sampling for the Chesconessex, Occohannock and Onancock Creeks and for replicated results from three sites and bi-weekly sampling for Cherrystone Inlet, Hungar's Creek and Old Plantation Creek. Dissolved Inorganic Phosphorus criteria in mg/l (Batiuk et. al. 2000. Submerged Aquatic Vegetation Water Quality and Habitat - Based Requirements and Restoration Targets: A Second Technical Synthesis. Chesapeake Bay Program, Annapolis, Maryland).



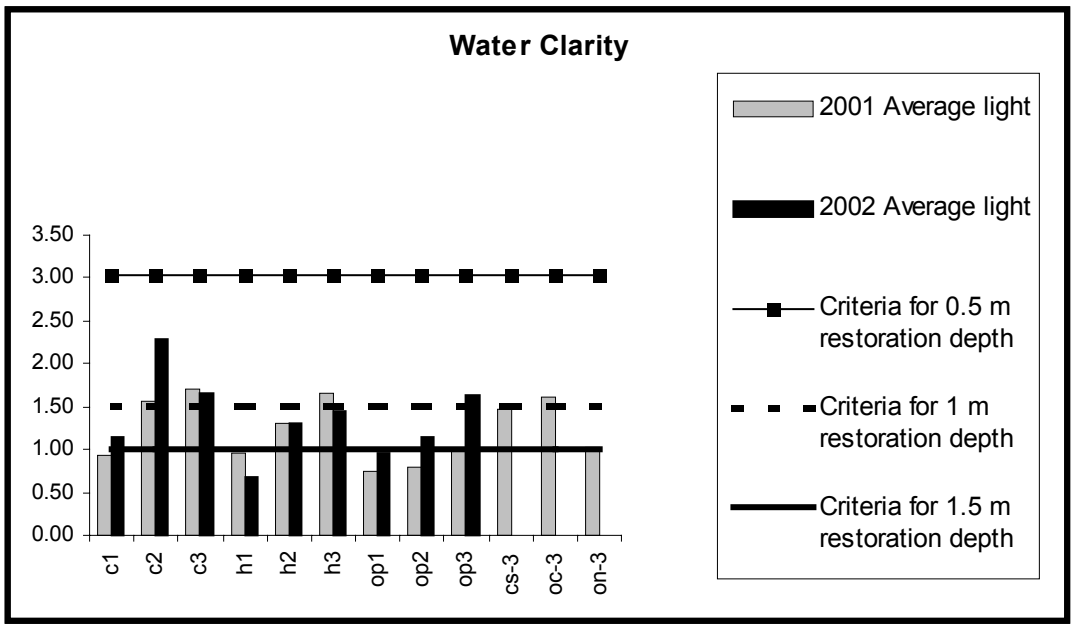
Chlorophyll: Figure 5 shows chlorophyll levels on the Eastern Shore during the 2001 and 2002 SAV growing seasons. With the exception of the Occohannock Creek in 2001 (average concentration of 18.07 ug/l) all creeks met the one-meter water restoration criteria requirement in 2001 and 2002. Chlorophyll concentrations were greatest in upstream stations in creeks with multiple stations.

Figure 5. 2001-2002 Chlorophyll Concentrations.
Average concentrations during SAV growth season (May - March and September - November) based on replicated results from a single site and monthly sampling for the Chesconessex, Occohannock and Onancock Creeks and for replicated results from three sites and bi-weekly sampling for Cherrystone Inlet, Hungar's Creek and Old Plantation Creek. Chlorophyll criteria in ug/l (Batiuk et. al. 2000. Submerged Aquatic Vegetation Water Quality and Habitat - Based Requirements and Restoration Targets: A Second Technical Synthesis. Chesapeake Bay Program, Annapolis, Maryland).



Water clarity: Figure 6 shows water clarity measured as light attenuation at the mouth (c1, h1, op1), midstream (c2, h2, op2) and upstream stations (c3, h3, op3) in Cherrystone Inlet (c1, c2, c3), Hungar's Creek (h1, h2, h3) and Old Plantation Creek (op1, op2, op3) in Northampton County. Also depicted are the water clarity measurements for stations on the Chesconessex (cs3) and Onancock (oc3) in Accomack County and the Occohannock Creek (oc3) in Northampton County. Light levels were sufficient for one and a half-meter SAV restoration at the mouth of Cherrystone Creek in 2001 and at the mouth of Hungar's Creek in 2001 and 2002. Old Plantation Creek also met the one and a half-meter criteria at the mouth, midstream and upstream in 2001 but only at its mouth in 2002. The average light levels in 2002 for the Old Plantation midstream station met the one-meter restoration criteria but the upstream station did not. Cherrystone Creek did not meet the one-meter restoration criteria in 2001 or 2002 at its mid stream or upper stream stations; while Hungar's creek met the one meter restoration criteria at its mid stream station both years and at its upper station in 2002 but not in 2001. Average light levels in the Chesconessex and Onancock Creeks met the one-meter restoration criteria but the Occohannock Creek did not.

Figure 6. Eastern Shore Water Clarity 2001-2002.
Average concentrations during SAV growth season (May - March and September - November) based on replicated results and monthly sampling for the Chesconessex (cs3), Occohannock (oc3) and Onancock (on3) Creeks. Replicated results and bi-weekly sampling averaged for Cherrystone Inlet (c1, c2, c3), Hungar's Creek (h1, h2, h3) and Old Plantation Creek (op1, op2, op3).

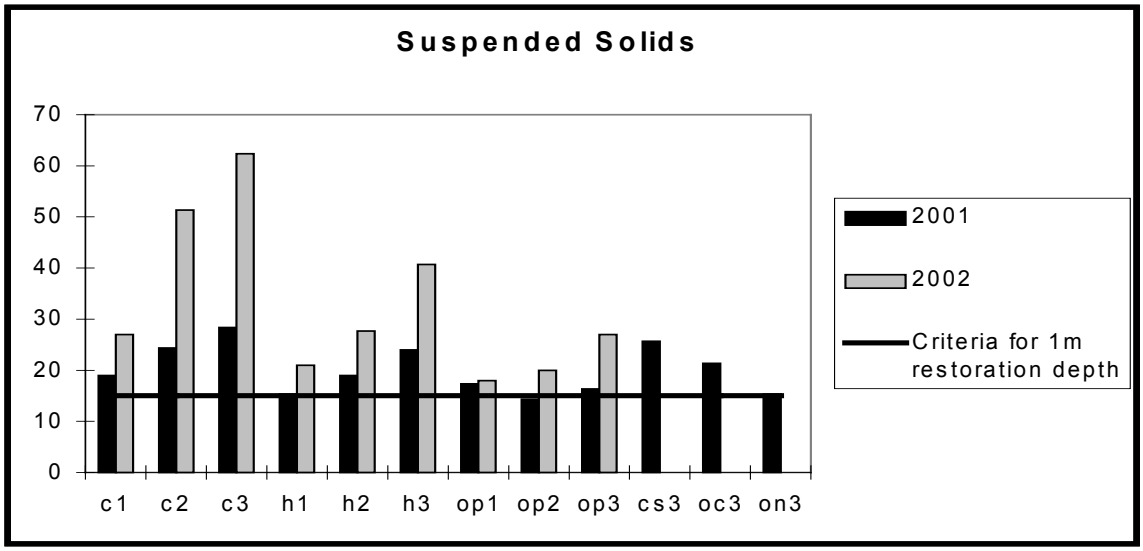


Stations with multiple sites were sampled at the mouth (c1, h1 and op1), midstream (c2, h2 and op2) and upstream (c3, h3 and op3). Water clarity criteria as light attenuation coefficient KD (Kollar and S. Bieber. 1992. Submerged Aquatic Vegetation Habitat Requirements and Restoration Targets: A Technical Synthesis. Chesapeake Bay Program, Annapolis, Maryland).

Suspended Solids: None of the stations on any of the Eastern Shore creeks met the suspended solid criteria for one-meter SAV restoration during SAV growing season in 2001 or 2002 with the exception of the midstream station on Old Plantation Creek in 2001 (figure 7). Where more than one site was sampled on a creek, suspended solid concentrations increased progressively in the upstream stations.

The Virginia Institute of Marine Science (VIMS) conducted a water quality study on Hungars Creek and Cherrystone inlet in 1997 (Data Report, Final Report for Task 84 FY95) and the Alliance for the Chesapeake Bay (ACB) studied water quality on the Chesconessex Creek system in 1999. As with the current study being conducted jointly by VIMS and the ACB, all SAV restoration criteria were met in the 1997 and 1999 studies except suspended sediment. Additionally, the 1997 VIMS study found total suspended solids showed either no spatial pattern or a pattern of increasing concentrations up into the creeks from the creek mouth. This suggests that local water shed runoff contributes to the excess solids concentrations and that water quality conditions for nutrients, chlorophyll and oxygen have not deteriorated in those creeks.

Figure 7. Eastern Shore Suspended Solid Concentrations 2001-2002.
Average concentrations for suspended solids for the SAV growing season (May - March and September - November). Averages based on replicated results and monthly sampling for the Chesconessex (cs3), Occohannock (oc3) and Onancock (on3) Creeks and for replicated results bi-weekly sampling for Cherrystone Inlet (c1, c2, c3), Hungar's Creek (h1, h2, h3) and Old Plantation Creek (op1, op2, op3). Suspended solid criteria in mg/l ((Batiuk et. al. 2000. Submerged Aquatic Vegetation Water Quality and Habitat - Based Requirements and Restoration Targets: A Second Technical Synthesis. Chesapeake Bay Program, Annapolis, Maryland).



Between January 2001 and December 2002, DEQ monitored 41 stations on 32 streams of the Eastern Shore as part of its long-term ambient water quality monitoring program and special studies. Relatively few of those stations were found to have violations of water quality standards. In Northampton County two stations were listed in the 2002 Impaired Waters report for oxygen violations: one station on Hungar's Creek and one on Mills Creek. The low oxygen concentration observed in Hungar's Creek is considered to be a naturally occurring condition. In Accomack County three stations were listed in the Impaired Waters report for dissolved oxygen violations: one station on Assawoman Creek, one on Onancock Creek (in its Northern Branch) and one on an unnamed tributary to Pitts Creek. Stations on several creeks in Accomack County were listed on the Impaired Waters report for moderate impairment to the benthic community: Gargathy Creek, Parker Creek, Petit Branch, Ross Branch, an unnamed tributary to Folly Creek, Sandy Bottom Branch and an unnamed tributary to Sandy Bottom Branch. The Sandy Bottom Branch and its unnamed tributary were also listed on the Impaired Waters report for exceeding the total phosphorus nutrient screening value.

PART TWO
Implementing the Chesapeake 2000 Agreement

In June of 2000 the governors of Maryland, Pennsylvania and Virginia, the Mayor of the District of Columbia, the Chairman of the three-state legislative Chesapeake Bay Commission and the Administrator of the U.S. Environmental Protection Agency (collectively known as the Chesapeake Executive Council) signed an ambitious new document developed to guide furture efforts to protect and enhance the Chesapeake Bay and its tributaries. This part of the annual report provides an overview of the implementation of that new Chesapeake Bay Agreement - *Chesapeake 2000: A Watershed Partnership* ("C2K"). A copy of the C2K Agreement is found in Appendix A.

I. Implementation Needs and Resources

Since the signing of the C2K Agreement in the June 2000 there have been increasingly refined and expanded efforts to determine:

(a) what resources will be required to fully implement the Bay agreement,
(b) what resources can reasonably be expected to be available given existing and anticipated funding patterns, and
(c) what gaps are likely to exist between what is needed and what is likely to be available.

In cooperation with the Chesapeake Bay Commission, Virginia, Maryland and Pennsylvania have embarked on a comprehensive effort to project the implementation costs of the C2K Agreement. Begun in June of 2002, this effort takes each of the 22 subsections of the Agreement and attempts, based on the best estimates available, to define the implementation costs to state governments and the projected revenue that will be directed towards those commitments. Information was provided by a variety of state agencies including the Department of Environmental Quality, the Department of Conservation and Recreation, the Department of Game and Inland Fisheries, the Chesapeake Bay Local Assistance Department, the Marine Resources Commission, the Department of Forestry and the Department of Transportation. Chesapeake Bay Commission staff are now compiling the data for formal release in January 2003.

Preliminary results of the survey were reviewed at a recent meeting of the Commission and are shown in the following table.

Projected (Billions)	MD	PA	VA	Total
Costs	6.5	6.9	5.7	19.1
Income	3.4	2.1	0.6	6.1
Funding Gap	3.1	4.8	5.1	13.0

II. State Implementation Activities

There are over 100 distinct tasks found in the commitments in the 22 subsections of the 5 main sections of the C2K Agreement. Summaries of progress being made under the 22 subsections of the agreement begin below. The summary of each subsection is in outline and bullet form for quick review. For those interested in further information on a particular subsection of the C2K Agreement or a commitment contained in a subsection please contact the Virginia Chesapeake Bay Coordinator, Russ Baxter, in the office of the Secretary of Natural Resources at 804-786-0044; or e-mail, rbaxter@gov.state.va.us.

SUBSECTION 1.1
OYSTERS

A. Major Issues

- By 2010, achieve at a minimum, a ten-fold increase in native oysters in the Chesapeake Bay, based upon a 1994 baseline.
- By 2002, develop and implement a strategy to achieve this increase by using sanctuaries sufficient in size and distribution, aquaculture, continued disease research, and disease-resistant management strategies, and other management approaches.

B. State Agency and Institution Participants

- State government participants include: DEQ, MRC, and VIMS.
- This is a Baywide commitment, with many State, Federal and private partners committing to the effort.
- This Baywide Oyster Plan for 2002 is being developed in a coordinated effort among all Bay partners.

C. Major Desired Outcomes

- Increase oyster populations 10-fold by 2010.
- Achieve associated benefits from oysters including improved water filtration, self-sustained growth of reef habitat, and a sustainable oyster fishery.

D. Approach to Achieving Outcomes

- A Baywide implementation strategy is being developed that builds upon the scientific and Baywide consensus that 10% of the available oyster grounds be dedicated and restored for oyster sanctuaries (primarily 3-dimensional reefs) and the remainder restored for oyster production.
- Virginia has been the leader in this approach, with the construction of more than forty, 3-dimensional reef sites Baywide since 1993.
- The effort in Virginia primarily involves habitat restoration with shell; however, there are important elements that involve aquaculture, disease research and management strategies, and oyster stock monitoring.

E. Status and Outlook

- **Status**
  - There has been significant progress in habitat restoration with the increased funding from partnerships, such as the Virginia Oyster Heritage Program. Federal partners including the Army Corps of Engineers, National Oceanic and Atmospheric Administration (NOAA), and EPA, as well as State and private sources have contributed significant levels of funding.

  - The Baywide Implementation Strategy should be completed by the end of 2002.
  - Stock assessment of current oyster populations indicate lower populations of oysters in 2001 than 1994 (the baseline for this commitment) despite the significant increase in funding and effort since that time.
- **Outlook**
  - There is still no significant, short-term strategy to counteract the devastating impacts of oyster diseases. This is the third year of significant drought and salinities are high, and oyster disease impacts are severe throughout Virginia and almost all of Maryland.
  - There will be a significant shortage of Chesapeake Bay oysters Baywide at least through 2005, which will severely impact the oyster industry.
  - Current high funding levels will be difficult to sustain based on success to date with the native oyster.
  - The current native oyster restoration strategy is a long-term strategy (decades to generations), which will require significant cultch restoration efforts for the entire period.
  - Cultch is currently limited to shucked, fresh shell and to available deposits of fossil shell. Fossil shell mining permits have been difficult to obtain for both States, and permit requirements have reduced the potential for success.

SUBSECTION 1.2
EXOTIC SPECIES

A. Major Issues Addressed by the Subsection
- Potential for major harm to Bay ecosystem and economy.
- Lack of safeguards against potentially harmful exotics.

B. State Agency and Institution Participants
- VIMS, DGIF, VDACS, VCU, VA Port Authority, DCR, MRC.

C. Major Desired Outcomes
- National programs to reduce and/or eliminate introduction of invasive species.
- Chesapeake Bay interim voluntary ballast water management program to address exotics in ballast water discharges.
- Chesapeake Bay management plans for invasive species.

D. Approaches to Achieving Outcomes
- Shape federal legislation, regulations and programs (i.e., National Invasive Species Act (NISA)).
- Develop statewide and regional management plans for top ranked species:
  - Develop a model management plan.
  - Develop generic recommendations for regional approaches.
  - Develop framework for future management plans.
- Obtain funding for regional pilot projects:
  - Mid-Atlantic Aquatic Nuisance Species Panel.
  - Bay-wide management plans.
  - Ballast water.

- Educate target groups:
  - Form taskforce to work cooperatively with industry, state, and environmental groups.
  - Ballast Water Symposium, hosted by MD Sea Grant, Baltimore, MD.
  - Legislative and media outreach in spring 2003 to discuss the top six species and selection criteria.
- Develop and implement prevention and control programs:
  - Implement Bay-wide management plans.
  - Implement voluntary ballast water management program.

E. Status and Outlook

- **Status**
  - Recommendations regarding invasive species issues in the Bay will be developed for consideration in the reauthorization of NISA.
  - A workshop on developing management plans for the top two invasive species will be scheduled as a follow-up to the Invasive Species in the Chesapeake Bay Watershed Conference which held in May 2002.
  - Workshop on ballast water management pending congressional action on legislation.
  - State law enacted requiring ships to report with voluntary management measures as contained in federal law (e.g., exchange at sea).
  - Invasive species panels representing the top six species will be meeting in Fall 2002 to begin the development of species management plans with completion by December 2002.
  - Implement species management plans beginning July 2003.
  - Set-up regional panel for Aquatic Nuisance Species (ANS).
- **Outlook**
  - Long-term solution to ballast water management likely.
  - Management of some of the established species possible.
  - Prevention of other accidental introductions very difficult.
  - Deliberate illegal introductions always a possibility.

SUBSECTION 1.3
FISH PASSAGE

A. Major Issues Addressed by the Subsection

- Lack of riverine habitat for migratory and resident fishes due to man-made physical and chemical (acid mine drainage) impediments throughout the Bay system.
- Declining populations of migratory fish species.
- Declining commercial fisheries throughout the Bay and corresponding harm to the economy.

B. State Agency and Institution Participants

- DGIF, MRC, VIMS, VCU, DOT, ODU.

C. Major Desired Outcomes

- Restoration of fish passage to 415.5 miles of riverine habitat in Virginia (1,357 miles Bay-wide) for migratory fishes under the Ten-Year Goal, and establish new fish passage goals to continue restoration effort.

- Restoration of alosine (e.g., shad, herring) fish populations through a long-term monitoring and restoration program.
- Tributary-specific management plans for target species.

D. Approaches to Achieving Outcomes

- Shape federal legislation, regulations and programs:
  - Participate in Fish Passage Task Group of the Chesapeake Bay Program's Non-Tidal Habitat Workgroup.
- Obtain funding for programs supporting fish passage implementation and monitoring.
- Share and synthesize information; implement restoration programs:
  - Fish Passage Program (coordinate fishway construction, dam removal, fishway and river monitoring and planning).
  - American Shad Restoration Program (fry stocking; structured cooperation among agencies and institutions; state and federal funding).
  - Modernize estimates of current and projected population sizes.
  - Continue relative abundance estimates of alosine fish in the fall zone.
  - Continue striped bass status assessment annually.
  - Development and modification of interstate and Chesapeake Bay Fishery Management Plans.

E. Status and Outlook

- **Status**
  - Final initiatives to complete the 2003 (ten-year) fish passage goal have been identified.
  - Several projects on tributaries are being explored at dams and road culverts (removals, fishways): 33 additional VA miles proposed through 2008 (total of 267 miles Bay wide).
  - American shad fry are stocked annually in the James River to enhance the population.
  - American shad numbers continue to increase annually at Boshers fishway.
  - A clear trend in actual abundance or exploitation only exists for striped bass.
  - Relative abundance estimates of alosine fish in the fall zone continue.
  - American shad are under a harvest moratorium in the Bay and its tributaries.
  - Striped bass stock sizes for Virginia are at an all-time high, based on several surveys.
  - River herring (alewife and blueback herring) are considered depleted.
- **Outlook**
  - Achievement of Ten-Year Goal of 415.5 miles likely but with some delays.
  - Abutment Dam fish passage project on the Appomattox will be completed in 2002 and opened for spring 2003.
  - Embrey Dam on the Rappahannock will be passable by 2004 and completely removed by 2006 (federal funding from this point out); will reopen 71 miles.
  - Brasfield Dam (Appomattox/FERC) fish elevator completion date unknown; would reopen 120 miles.
  - Restoration of migratory fish populations possible, but requires long-term commitment.
  - American shad fry stocking being considered on the Rappahannock and Appomattox rivers.
  - River herring experimental stocking being discussed.

- A considerable effort is needed to develop even approximate tributary-specific target stock sizes for American shad and river herrings, based on projected fish passage.
- Boshers Dam fishway monitoring will help track progress of shad restoration.
- Striped bass are less dedicated to specific tributaries than alosine fish making it more difficult to set tributary-specific targets for striped bass.
- Restoration of commercial fisheries questionable and highly dependent on support of harvesters for restoration programs:
  - Offshore American shad harvest will be reduced 40% by December 2002 (required by Atlantic States Marine Fisheries Commission).
  - A quantified assessment of river herring stock sizes is needed.
- Revising management plans to implement the scheduled reduction in coastal fishing may or may not significantly improve American shad stock sizes.
- In the near future fishery independent programs must be developed to ascertain reliable measures of American shad and river herring abundance and exploitation levels because there is no fishery-dependent data source.

SUBSECTION 1.4
MULTI-SPECIES MANAGEMENT

A. Major Issues Addressed by the Subsection

- Potential for imbalance in Bay ecosystem and species population levels.
- Outdated fisheries management plans (FMPs) based on single species.

B. State Agency and Institution Participants

- CBP–Living Resource Subcomm., CBP-Stock Assessment Comm., VIMS, MRC.

C. Major Desired Outcomes

- Ecosystem-based multi-species FMPs for targeted species.
- All other CBP fishery management plans revised and implemented, incorporating:
  - ecological, social and economic considerations
  - multi-species fisheries management and ecosystem approaches

D. Approaches to Achieving Outcomes

- Expand the scope of fisheries management planning.
- Utilize the NOAA Chesapeake Bay Fishery Ecosystem Plan to define ecosystem linkages and the priorities for multispecies plan development.
- Coordinate interests of the Chesapeake Bay Program partners and identify emerging fishery interests.
- Continue development, implementation and review of multispecies FMPs.

E. Status and Outlook

- **Status**
  - Zooplankton Index of Biotic Integrity program funded (EPA/CBP).
  - Continuing SAV distribution annual survey (EPA/CBP).
  - CBP Scientific Technical Advisory Committee workshop held on suspension-feeder modeling, and modeling funds allocated for 2002 (EPA/CBP).
  - Preliminary analysis of fisheries data with strategy tools identified:

    - Baywide multi-species monitoring program in progress (NOAA); Juvenile finfish trawl survey (CHESFIMS) conducted by Chesapeake Biological Labs; Adult finfish trawl survey (CHESMMAP) conducted by VIMS.
    - Modeling (single species and multi-species) (EPA/CBP, NOAA/CBO); Entering data for ecosystem model (ECOpath with ECOsim); Multi-species assessment model under development.
    - Fishery Ecosystem Plan to be completed in 2003.
- **Outlook**
  - Cost of establishing species inventory and interactions is extensive.
  - Accuracy and efficiency of stock assessments will be improved.
  - Affords better estimates of stock size and productivity of many species.
  - Need to assess benefits of desired biomass of predator and prey populations.
  - Able to use models to include more dynamic species interactions.

SUBSECTION 1.5
CRABS

A. Major Issues Addressed by the Subsection

- Manage to promote increases in blue crab abundance and the spawning stock.
- Lower bay-wide exploitation rates from 51% per year to 43% per year.

B. State Agency and Institution Participants

- MRC, VIMS, ODU.
- MRC industry (recreational and commercial) advisory committee.

C. Major Desired Outcomes

- A healthy spawning stock and abundance level to sustain:
  - Successful recruitment over time.
  - Viable commercial and recreational fisheries.
  - Industry infrastructure and economic opportunities.
  - A continuous, coordinated bay-wide management process.

D. Approaches to Achieving Outcomes

- Manage to augment the spawning stock:
  - Through short-term reductions in harvest or effort.
  - Through maintenance of long term spawning sanctuaries.
- Protect and restore submerged aquatic vegetation to:
  - Reduce blue crab natural mortality events.
  - Increase availability of prey items.
- Coordinate effective management strategies to:
  - Continue involvement and education of all stakeholders.
  - Assess effectiveness of existing regulations.
  - Complement other Chesapeake Bay jurisdictions' conservation measures.

E. Status and Outlook

- **Status**
  - New harvest reduction measures were established in 2001 and 2002.

  - The bay-wide target is a 15% reduction in harvest by 2003.
  - Virginia has met its 15% reduction target in 2003:
    - Additional expansion of summer spawning sanctuaries is complete.
    - 2001 data indicate a slight increase in the spawning stock size.
  - An increase in SAV since 1999 follows a 6-year period of decline.
- **Outlook**
  - Exploitation rate has been reduced from 51% to 47% in 2001.
  - Despite the increase in the spawning stock, it is still at a very low level.
  - Added measures implemented in 2002 to reduce exploitation to the 43% target
  - Assuming optimal environmental conditions, spawning stock should double in 3-4 years.
  - Funding reductions at VMRC may lead to decreased enforcement efforts, which may result in increased illegal harvesting. Therefore, overall crab harvest limits might not be maintained.

SUBSECTION 2.1
SUBMERGED AQUATIC VEGETATION (SAV)

A. Major Issues Addressed by the Subsection

- Preserve, protect and restore SAV through:
  - Recommitment to existing 114,000 acre protection and restoration goal.
  - Revision of restoration goal and implementation of strategies to accelerate protection and restoration efforts.

B. State Agency and Institution Participants

- VIMS, MRC, DEQ and DCR.

C. Major Desired Outcomes

- New SAV restoration goal based on historic abundance.
- Bay Program strategy to accelerate restoration efforts that will address water clarity, water quality and bottom disturbances.

D. Approaches to Achieving Outcomes

- New Goal:
  - Review of historic information including aerial photography to assess historic abundance of SAV.
  - Determine water clarity and water quality goal for SAV and depth criteria.
  - Determine areas where SAV not expected to grow.
- Protection and Restoration Strategy:
  - Identification of funding opportunities.
  - Identify appropriate allocation of resources between water quality improvement and SAV planting and transplantation.
  - Identify research priorities and monitoring needs.

E. Status and Outlook

- Goal and Strategy development coordinated through CBP Living Resources Subcommittee by end of 2002.

- Restoration and protection efforts involve management of State owned submerged lands (MRC), transplantation research and monitoring (VIMS), point source pollution management (DEQ) and non-point source management (DCR).
- Strategy implementation in part through shallow water management plan under development in response to House Joint Resolution 765 (2001 Session).
- Restoration will be dependent on improvements in water quality.
- Planting and transplantation efforts will be dependent on research and development of funding sources as well as support of voluntary programs.
- Continuation of annual monitoring essential.

SUBSECTION 2.2
WATERSHEDS

A. Major Issues Addressed by the Subsection

- To achieve C2K goals, water quality issues must be approached on a small watershed level.
- Need to develop and implement locally supported watershed management plans.
- Involve local governments, community groups, watershed associations.
- Protect stream corridors, wetlands habitat and water quality.
- Dependant on Subsection 4.2-Sound Land Use and 5.2-Community Engagement.

B. State Agency and Institution Participants

- DCR, CBLAD, DEQ, DGIF, DOF and VIMS.

C. Major Desired Outcomes

- Widespread local/community involvement.
- Create local constituency awareness about watershed protection.
- Implement watershed management plans in two-thirds of Bay watershed:
  - Pilot projects that promote stream corridor protection and restoration.
  - Develop stream corridor restoration goals based on local watershed management planning.

D. Approaches to Achieving Outcomes

- Virginia taskforce formed to guide implementation:
  - Define watershed management plan.
  - Identified current watershed planning efforts, training and tracking needs for future watershed planning efforts.
- Development of aids:
  - Small watershed management planning guide.
  - Technical guides:
    - Virginia's water quality standards and monitoring efforts.
    - Outreach and capacity building skills, working with Virginia's Watershed Roundtables, Councils, Forums and Commissions.
    - Virginia's tributary strategies and TMDL effort.
  - Regional staff to implement small watershed management planning tasks.
  - DCR and CBLAD team effort.

- Full implementation of Chesapeake Bay Preservation Act.

E. Status and Outlook

- Watershed management plan components defined.
- DCR has hired regional Watershed Field Coordinators (7) to assist in the development and implementation process.
- Staff training underway.
- Identified local community watershed organizations.
- Surveyed community watershed organizations (CWOs) and local governments on current level of planning efforts, given definition of watershed management planning.
- Mini-grants will be awarded to targeted groups with demonstrated capacity to successfully develop and implement a watershed management plan.
- Local government involvement -- the challenge of implementing "an unfunded mandate" at the local level.
- Labor intensive process.
- Major demand on existing technical resources.
- Financial assistance to local governments and CWOs is limited.
- Local citizen organizations are interested.
- Expand Virginia taskforce to address all C2K commitments affecting local governments and community watershed organizations.

SUBSECTION 2.3
WETLANDS

A. Major Issues Addressed by the Subsection

- Ensure tidal and non-tidal wetlands functions and values are not lost.
- Encourage preservation of key wetlands on a watershed basis.
- Encourage voluntary restoration of degraded or converted wetlands.

B. State Agency and Institution Participants

- DEQ, VMRC, DGIF, DCR, CBLAD, VIMS, Local Governments.

C. Major Desired Outcomes

- Achieve no net loss of existing wetland acreage and function through regulatory programs.
- Achieve net wetland resource gain through wetland restoration:
  - 25,000 acres by 2010.
  - Average restoration rate of 2,500 acres per year after 2005.
  - Midcourse evaluation in 2005.
- Assist local governments and community groups with development of wetland preservation plans:
  - as part of integrated locally based watershed planning.
  - implement in 25% of land area in Bay watershed by 2010.

D. Approaches to Achieving Outcomes

- Regulate activities in wetlands through permitting program

  - avoidance and minimization of impacts
  - compensation for unavoidable impacts
- Improve monitoring and enforcement activities
  - no unpermitted impacts
  - ensure success of compensation efforts
- Provide technical assistance to local governments to protect sensitive wetlands
- Improve tracking of wetlands losses and gains through centralized database
- Implement new voluntary programs, and build on existing programs and partnerships, to achieve net resource gain

E. Status and Outlook

- Regulatory programs are working toward achieving no net loss of wetlands:
  - Tidal wetlands program ongoing:
    - Currently reviewing Mitigation/Compensation policy to address formerly non-compensated losses associated with small impact shoreline stabilization projects.
  - Comprehensive state non-tidal wetlands program fully implemented on October 1, 2001:
    - Most activities in wetlands regulated.
    - Compensation required sufficient to achieve no net loss.
    - Use of general permits provides time to focus on compliance/enforcement.
    - Approval of State Programmatic General Permit will allow more control over permitting and compensation for smaller impacts.
- Preservation of wetlands is being encouraged:
  - CBLAD working with local governments on wetland preservation in Resource Protection Areas.
  - State provides financial incentives for conservation of wetlands through Virginia Outdoors Foundation and Virginia Land Conservation Foundation.
  - Conservation Reserve Enhancement Program (CREP) has targeted 3000 acres in the Bay drainage for restoration, and provides cost share payments to landowners.
  - Virginia Strategy for the Development and Implementation of Wetlands Preservation Plans:
    - outlines how multiple agencies will coordinate with local governments to develop planning tools and guidance on preservation planning.
    - includes targeting key wetlands, tracking of success.
    - funding for this effort remains to be identified.
  - Virginia Wetlands Restoration Coordinating Committee :
    - opportunities for preservation and restoration of wetlands on state lands are being identified.
    - funds and better partnering with federal and non - profit organizations needed.
  - EPA State Implementation Grant in cooperation with Alliance for the Chesapeake Bay being sought for public outreach/education on wetland restoration.

SUBSECTION 2.4
FORESTS

A. Major Issues Addressed by the Subsection (Note: 2.4 overlaps with 2.2, 2.3, 4.1)

- Loss and degradation of both riparian and upland forests (45,000 acres/year).
- Water quality, habitat, recreation, aesthetics benefits decreasing.
- Difficulty of conserving and connecting riparian and upland forests.

B. State Agency and Institutional Participants

- DOF chairs Statewide Riparian Working Group established by Executive Order #48 (1999) including CBLAD, DCR, DGIF, DEQ, VDOT, General Services, VIMS, VA Tech, VA State, Federal Natural Resource Conservation Service (NRCS) and US Forest Service:
  - Ad-Hoc Conservation Reserve Enhancement Program (CREP) Technical Group includes Ducks Unlimited, Bay Foundation, and SWCD and federal NRCS State Technical Committee discuss riparian and conservation issues.
  - Land Trust consortium-Virginia United Land Trusts (VaULT) new and active.
- CBLAD enforces Bay Act provisions, which require the conservation of a 100-foot buffer on all streams and shorelines.

C. Major Desired Outcomes

- Continuation of multi-agency cooperative effort in restoring and planting riparian areas on private land.
- Increase in the number of conserved forest acres both upland and riparian.
- Fostering of voluntary "hub/corridor" approach connecting key "working landscapes".
- Increased riparian efforts in the urban arena.

D. Approaches to Achieving Outcomes

- Continuing effective cost-sharing program for landowners (CREP).
- Intensify cooperative, collaborative approach among federal and state agencies.
- Continue efforts to support increased funding for "working landscape" conservation easement purchases and donations.

E. Status and Outlook

- Strong, existing agency partnerships in both riparian and conservation work:
  - Need to make headway in urban arena-marketing efforts weak with development community. Opportunity to merge efforts with recent stormwater initiative.
  - Need to strengthen Geographical Information System (GIS) efforts to target conservation efforts.
- Achieved 610-mile goal during spring 2002 - 8 years ahead of schedule mostly due to CREP. Need to renew CREP as a critical component of continued success.
- Success may plateau without additional technology transfer and staff; easiest projects may have been completed -- more difficult landowners/tracts remaining.
- Strong upward trend in easement donations.
- Federal conservation funding risky and inconsistent --not enough to achieve goal.

SUBSECTION 3.1
NUTRIENTS AND SEDIMENTS

A. Major Issues Addressed by the Subsection

- Portions of Bay and tidal tributaries included on 303(d) List of Impaired Waters due to low dissolved oxygen and general standards violations.
- Nutrient over-enrichment, excessive sedimentation and natural conditions cause the impairments.
- In working to delist the Bay by 2010, significant regulatory and planning actions are needed over next two years, including:
  - Establish revised designated uses and water quality criteria for a restored Bay
  - Assign nutrient/sediment loading allocations for major river basins
  - Revise tributary strategies to meet new load allocation and reduction goals
  - Adopt criteria and uses in the State Water Quality Standards

B. State Agency and Institution Participants

- DEQ, DCR, CBLAD, VIMS, VDH and VDOT.

C. Major Desired Outcomes

- Restored water quality, habitat, and living resources.
- If restored by 2010, delist Bay and tidal tributaries from 303(d) List.
- If not restored by 2010, complete restoration under TMDL.

D. Approaches to Achieving Outcomes

- Federal-Interstate CBP has formed a Water Quality Steering Committee; includes six Bay watershed states, DC, EPA, River Basin Commissions and local governments, to develop criteria/designated uses and basin allocations.
- MOU signed by EPA and all Bay watershed states, including headwater states (not signatories of the Chesapeake 2000 Agreement) of NY, WV, and DE.
- Complex regulatory process to change designated uses and adopt nutrient related criteria as water quality standards:
  - requires *Use Attainability Analysis* to justify adopting subcategories of aquatic life uses for the Bay and tidal rivers.
  - numeric criteria to include: dissolved oxygen (revised), water clarity, and chlorophyll
- Loading allocations among major river basins based on criteria attainment and what is feasible, equitable and cost-effective.
- States have lead on tributary strategies and revisions.
- State tributary teams interact and coordinate with local governments, affected and interested stakeholders, Watershed Roundtables, Councils, Forums, and River Basin Commissions to achieve local/public selection of strategy actions.

E. Status and Outlook

- This process will result in much higher restoration goals; potential for needed control actions could be extreme and costly.
- Rough capital cost estimate for point and nonpoint source nutrient and sediment controls in VA: $1.7 to 2.7 Billion (High estimate = $4.8 Billion).

- Revised nutrient and sediment load allocations must be made to all major basins; expect process to find equitable and feasible allocations among basins and states to be controversial.
- Extremely compressed timeline to complete tasks; schedule already slipping due to technical delays.
- Completed second round of public comment and scientific peer review of draft criteria and designated uses in July 2002:
  - 14 stakeholder/partner groups responded.
  - nearly 800 individual comments received.
  - CBP Technical Criteria Workgroups now drafting responses/revisions based on comments, and plan to have a third round of review in Oct.-Nov. 2002.
- Final products expected in April 2003:
  - Bay-specific, EPA regional water quality criteria published for dissolved oxygen, water clarity, and chlorophyll.
  - Baywide guidelines for defining attainment of the three criteria.
  - Consistent methodology to delineate designated use boundaries across the States.
  - Initial load allocations for nitrogen, phosphorus, and sediment by major tributary basins.
- Upon publication of criteria, using their best efforts, States then proceed with standards adoption process from 2003-2005.
- Tributary strategy revisions scheduled (per C2K) to be complete one year after load allocations provided.
- Concerns at the State level about available staff/resource levels to effectively work on five tributary strategies simultaneously, and to have substantial stakeholder involvement prior to adoption of final water quality standards.
- Likely public perception of Tributary Strategy revision process: while State seeks increased effort, current actions are lagging due to insufficient financial and technical resources.

SUBSECTION 3.2
CHEMICAL CONTAMINANTS

A. Major Issues Addressed by the Subsection

- Fulfill 1994 Toxics Reduction and Prevention Strategy goal: "A Bay free from toxic or bioaccumulative impacts on living resources or human health".
- Chesapeake Bay Toxics Strategy revised in Dec. 2000 (Toxics 2000 Strategy).
- Strive for "zero release" of chemical contaminants from both point and nonpoint sources, using voluntary, cooperative means, which go beyond traditional regulatory control programs.
- Expand participation in, and effectiveness of, Businesses for the Bay.
- Better understand the effects and impacts of chemical contaminants to increase effectiveness of management actions.

B. State Agency and Institution Participants

- DEQ, CBLAD, DCR, DGIF, VDACS, VDH, and VIMS.

C. Major Desired Outcomes

- Restored water quality, habitat, and living resources.

- Reduce, and where possible eliminate, discharges and releases of chemical contaminants to the Bay and its tributaries.
- Continue studying chronic, sub-lethal impacts that low-level concentrations of chemical contaminants may have in the Bay (e.g., possible lowered disease resistance in oysters).

D. Approaches to Achieving Outcomes

- State staff participates in the CBP Toxics Subcommittee, which uses a targeted approach with specific chemical and geographic focus.
- Efforts to reduce toxic inputs from point and nonpoint sources ongoing through voluntary pollution prevention measures and regulatory mechanisms.
- A Voluntary Mixing Zone Phase-Out Strategy was developed (August 2001) to target point sources. Applies only to "persistent and bioaccumulative toxics" (PBTs) in "Regions of Concern" and "Areas of Emphasis".
- Monitoring projects developed annually to aid in characterizing regions of the Bay regarding levels of chemical contamination and any impacts on living resources, especially in "Areas of Emphasis" and "Areas of Insufficient Data".

E. Status and Outlook

- Voluntary Mixing Zone Phase-Out Strategy being implemented with input from point source representatives; initial identification of targeted plants completed.
- In VA, 9 facilities identified within "Region of Concern" (Elizabeth River) and "Area of Emphasis" (Lower James) with effluent limits greater than water quality standards for the listed PBTs (i.e., mixing zone allowed).
- Much work remains on making the connection between targeted plants and P2 programs; questions remain over how to "close the deal" (i.e., form of agreement).
- Virginia is the leader among the Bay states in *Businesses For The Bay* with 236 participants, accounting for half of the program participants in the watershed.
- Future availability of State and Federal funding support for characterization monitoring is uncertain. Chemical contaminant analyses concurrent with effects-based studies are relatively expensive.

SUBSECTION 3.3
PRIORITY URBAN WATERS

A. Major Issues Addressed by the Subsection

- Support restoration of "Regions of Concern", where toxic impacts on living resources are documented and chemical contamination is above acceptable levels.
- Virginia's only "Region of Concern" is the Elizabeth River.

B. State Agency and Institution Participants

- DEQ, CBLAD, DCR, VIMS, and Elizabeth River Project (ERP, citizens' group).
- ERP has taken a leadership role in the restoration initiative.

C. Major Desired Outcomes

- Restored Elizabeth River water quality, habitat, and living resources.
- Remediate sediment contamination, and reduce/eliminate ecosystem impacts.

D. Approaches to Achieving Outcomes

- Continued implementation of the 1996 Elizabeth Regional Action Plan (RAP), an 18-point framework to restore the environmental health of Elizabeth River.
- Elizabeth River Watershed Action Plan, Revised Second Edition, endorsed by the Commonwealth in Sept. 2002, and accepted as the updated RAP. The old 18 actions are streamlined into a succinct "Clean 14".
- Focus areas: sediment remediation, stormwater runoff control, wetland restoration, pollution prevention, and monitoring. Two new actions added:
  - give priority to educating students and the public.
  - recognize litter as the average citizen's most tangible concern.

E. Status and Outlook

- Army Corps of Engineers recon study identified Scuffletown Creek on Southern Branch as leading candidate for sediment remediation. River sediment clean-up is the highest priority of the RAP, and this first step will aid in demonstrating cost-effective techniques to be applied at other sites.
- Feasibility study estimates $8.5 million to remediate this site; now in preliminary engineering design. Federal government expected to cover 65% of cost.
- Between FY99-02, VA contributed $676,000 (funding and in-kind services); the FY03 budget is $30,000.
- Wet weather monitoring plan under development; will aid in better management of storm water inputs.
- Broad based monitoring program underway: water, sediment, benthics, fish tissue. Program cost: had been $450,000 per year; reduced to approx. $200,000 per year for FY03/04.
- ERP has been very successful over the years in fostering public awareness and involvement of the local governments, federal agencies, and area businesses.
- Reductions in General Fund budget will impact progress and may hinder local government support and federal cost-share availability.

SUBSECTION 3.4
AIR POLLUTION

A. Major Issues Addressed by the Subsection

- By 2003, assess effects of airborne N-compounds and chemical contaminants on the Bay ecosystem and help establish reduction goals for these pollutants.
- About 25-30% of the total N-load to the Bay is estimated to orginate from air deposition, primarily as NOx, although airborne NH3 may also be important.

B. State Agency and Institution Participants

- DEQ

C. Major Desired Outcomes

- Establish baselines for N-compounds and chemical contaminant emissions.
- Set reduction goals, and estimate achievements that can be made using existing regulatory and pollution prevention methods (i.e., NOx State Implementation Plan (SIP) call reductions).

B. Approaches to Achieving Outcomes

- Focus of air pollution control is on protecting human health, not assessing effects of airborne emissions on the Bay ecosystem.
- VA requires NOx emission monitoring from power plants and some major industries from May – September. Monitoring will expand in 2004.
- NOx emissions from motor vehicles are calculated based on factors such as vehicle model years, speed, and miles traveled.
- Air deposition N-loads will be factored into the major Bay tributary load allocations, both as a part of the surface runoff from land and also directly to the water surface.
- VA continues to implement the federal Hazardous Air Pollutant program, which will reduce emissions of 188 chemical contaminants.
- The State Advisory Board on Air Pollution presented a draft report about airborne pollutant deposition to the Bay to the VA Air Pollution Control Board in November 2002, which should aid in setting reduction goals. The EPA Bay Program will also be running various model scenarios including the Bush Administration's "Clear Skies" emission control initiative.

E. Status and Outlook

- VA has adopted regulations to substantially reduce power plant and large industrial source NOx emissions, which are under review by EPA:
  - Each source must comply with the new requirements by May 31, 2004.
  - Expect emission reductions of nearly 55% -- from 47,000 to about 26,000 tons each year during the ozone season (May – September).
  - The permanent statewide NOx emission cap for all subject sources will be on the order of 21,000 tons per ozone season.
- VA will adopt additional regulations for sources subject to the Hazardous Air Pollutant standards as EPA finalizes them. Sources must comply with these standards by 5/15/07; data not yet available to quantify reductions needed.
- To be effective on a large scale, air pollution must be controlled outside the Bay Program boundaries. The air pollution "emitter zone" is roughly 5-times as large as the "receptor" zone, coming from mid-western states not in the Bay Program.

SUBSECTION 3.5
BOAT DISCHARGE

A. Major Issues Addressed by the Subsection

- By 2003, establish appropriate areas within Chesapeake Bay and its tributaries as “no discharge zones” for human waste from boats.
- By 2010, expand by 50% the number and availability of pump-out facilities

B. State Agency and Institution Participants

- DEQ, VDH, VMRC, DGIF and DCR.

C. Major Desired Outcomes

- Reduce shellfish closures and threats to human health from boat waste discharges.
- Improve boater awareness of proper waste disposal.

D. Approaches to Achieving Outcomes

- Use Federal Clean Vessel Act (CVA) grant funding to increase the number of pump-out facilities. CVA is a national, competitive grant program under US Fish and Wildlife Service (FWS). Figures for Virginia's program:
  - CVA funds received: FY99 = $542,000 (coastal) and $38,000 (inland); FY00 = $644,100 (coastal) and $104,700 (inland). No new funding received in FY01 or FY02 (carry-over unused and reprogrammed funds).
  - Jan. 2001 inventory of marinas with pump-outs listed about 240 facilities in Virginia. A 50% increase in this figure would be an additional 120 systems. There are about 815 marinas and other places where boats are moored in Virginia.
- To further promote program, CVA grants can be used for maintenance.
- Virginia has only one area designated as No Discharge Zone -- Smith Mountain Lake.
- Public hearing held in September 2002 on a draft regulation that would govern boat discharges. No significant comments received; next action -- recommend that the SWCB approve final regulation at their January 2003 meeting.
- VDH participates in education programs, providing grants to assisting partners. Student interns in Smith Mountain Lake and Tidewater areas pass out literature and promotional items at marinas, stressing the importance of proper sewage disposal. Interns will also empty the sewage holding tanks at no charge. Ferrum College manages Smith Mountain Lake program; HRSD oversees Tidewater area.
- C2K calls for reassessment of progress by 2006.

E. Status and Outlook

- VA will likely reach the increased pump-out availability goal well before 2010, although the installation rate has slowed somewhat as most of the easier projects have been completed. The maintenance program is still new and as marina owners become more informed about its availability the installation rate is expected to increase.
- Limited effort has been made to-date in Virginia to identify Bay "no-discharge" zones. The ability to effectively enforce such a designation is the major concern given limited resources. Experience is being gained through the declaration of Smith Mountain Lake as a NDZ (enforcement by DGIF).
- CVA grant funding authorization set to expire after FY03. USFWS and stakeholder groups working toward reauthorization of the CVA as currently structured/funded, and expect program to continue for another five years.

SUBSECTION 4.1
LAND CONSERVATION

A. Major Issues Addressed by the Subsection

- The open space lands in the Bay Watershed have experienced developmental pressures that have led to the increasing loss of forest, agricultural, and other significant historic, recreational, ecological, and scenic lands. The degradation of these lands has also negatively effected water quality and living resources. In an effort to balance land lost to development and slow continued conversion, the C2K Agreement contained several key land conservation strategies, including:
  - Permanent preservation of 20% of the land area in the watershed.

  - Identification and creation of funding sources for land preservation.
  - Assessment of resource lands including forests and farms.
  - Targeting of key lands for protection.
  - Delivery of tools to localities to promote land conservation and sustainable use.
  - Tracking progress towards the 20% goal.
- Parallels riparian forest conservation and restoration commitments in Subsect. 2.4.

B. State Agency and Institution Participants

- DCR, VOF, VLCF, DOF, DGIF, DHR, CBLAD, VMRC, VIMS, VDACS, VDOT, TAX, VGIN, DHCD.

C. Major Desired Outcomes

- Achieve the 20% goal by preserving an estimated 1,095,099 acres of land in the watershed. As of June 30, 2002, Virginia's remaining estimated proportional target of this goal is 483,553 acres.
- Establish a stable funding source for land conservation through the VLCF.
- Develop tools for targeting the preservation of open space.
- Complete the development of a web-based system of conservation lands.
- Preserve Virginia's working landscape of forests and agricultural lands.
- Preserve Virginia's scenic and recreational landscapes for future generations.
- Preserve sensitive plant communities and habitat for valuable fish and wildlife resources, and achieve water quality benefits.

D. Approaches to Achieving Outcomes

- Virginia will need significant and stable funding to achieve the land preservation goal. Potential mechanisms include:
  - The Governor's proposed amendment in the nature of a substitute on SB592 (2002) instituting a $5 per ton solid waste disposal fee; $76 million.
  - HB341 (2002) Virginia Land Conservation Foundation; dedication of recordation taxes – continued to 2003; up to $40 million per year from recordation tax.
  - 2002 Appropriation Act Language provides optional vehicle registration fee revenue to Jamestown-Yorktown Foundation and VLCF. Based on July 2002 vehicle registration figures, estimates now range from $0.5 to $1 million for VLCF.
  - HJ255 and SJ159 (2002) Study resolutions requesting the Secretary of Natural Resources to examine options for providing a stable source of funding for the conservation of open space.
  - HB1284 and SB673 (2002) Capital Projects; Public and College Building Authority; $20 million for land acquisition of parks and natural areas.
  - HB1144 and SB672 (2002) Commonwealth of Virginia Parks and Natural Areas Bond Act; $36.5 million for land acquisition of parks and natural areas.
  - Leveraging Federal Funds; LWCF; Forest Legacy; CREP; TEA21, USFWS, NOAA, etc.
  - Advocacy for Federal Funds; The Conservation and Reinvestment Act of 2001 (CARA); Could have provided a total allocation of $52 million to VA.
  - Encourage Public-Private Partnerships; Conservation donations to the Virginia Outdoors Foundation; Need to challenge the private sector to contribute to the effort.

E. Status and Outlook

- **Status:**

- Of the Bay's almost 39 million acres, the Bay jurisdictions had already protected 17.2 % or 6,688,757 acres as of June 30, 2000.
- In its report for the period July 1, 2001 through June 30, 2002, the Bay region of Virginia has since June 30, 2000 experienced:
  - an increase in preserved land of 34,720 acres in FY01 and 35,873 acres in FY02.
  - a decrease of 22,203 acres due to baseline adjustments in FY01 and an increase of 18,197 due to baseline adjustments in FY02.
  - a net gain of 66,588 permanently preserved acres.
  - a reduction in its target to 483,553.40 acres.
- Virginia will be releasing a web-based conservation site in the fall of 2002 that will include public access to the state's Conservation Lands Database that includes all lands permanently protected by federal, state, and local governments and private entities, and a variety of other conservation information.
- The Commonwealth is working on the first version of the Virginia Conservation Lands Assessment that will allow the state to target critical lands for conservation.
- The conservation community in Virginia has completed a series of regional workshops and generated a draft report entitled "*Linking Lands: Conserving Virginia's Green Heritage*". The report notes that top priorities include the designation and protection of corridors, the protection and retention of private agricultural and forested lands, the protection of environmentally sensitive lands, and the protection of historical resources. The report sets out strategies to achieve these priorities.

- **Outlook:**
  - At an average rate of 35,296.98 acres per year, it will take approximately 13.7 years to reach Virginia's adjusted 483,553.40-acre target.
  - For Virginia to reach its adjusted target, it will require an expenditure of $79,786,311 each fiscal year from FY04 through FY10. This will require Virginia to conserve 69,076 acres per fiscal year.
  - Virginia's success is dependent on funding.

Estimated Costs and Timelines for Land Conservation

Acre Goal	Price per Acre	Total State Cost (Assumes an additional 50% non-state match)	State Contribution per Year	# of Years	# of Acres per Year
483,553 CB	$1,155*	$558,504,177	$10,000,000	55.85	8,658
483,553 CB	$1,155	$558,504,177	$20,000,000	27.93	17,313
483,553 CB	$1,155	$558,504,177	$30,000,000	18.62	25,970
483,553 CB	$1,155	$558,504,177	$40,000,000	13.96	34,638
483,553 CB	$1,155	$558,504,177	$79,786,311	7.0	69,076
483,553 CB	$2,255**	$1,090,412,015*			

CB – Chesapeake Bay 20% goal – adjusted Virginia target

*This price represents the state's average cost per acre through the VLCF program which represents about ½ of the total project cost. This value ($1,155 per acre) is also about ½ of the historic Bay average ($2,255 per acre).

**This CBC/TPL estimate expresses total cost.

- Estimates assume that the state will be responsible for the entire acreage goal. However, it is possible that as much as 14.7% of the acreage goal may be achieved through private/non-profit activity independent of state monies.

- As this is a Bay goal, Maryland, Pennsylvania, and the District of Columbia may surpass their targets by 2010 and thereby help reduce Virginia's target.

SUBSECTION 4.2
DEVELOPMENT, REDEVELOPMENT AND REVITALIZATION

A. Major Issues Addressed by the Subsection

- Promote "sound land use" and "good development" resulting in the reduction of harmful effects from sprawl development.
- Holistic approach to development, redevelopment and revitalization involving issues of location, site design and land use policy.
- The need to work within existing statutory framework within which local jurisdictions have been delegated authority regarding growth and development.
- The need to better communicate and interact with local governments/PDC's and others to achieve these water quality goals at the local level.
- Dependant on 2.2-Watersheds and 5.2 Community Engagement subsections.

B. State Agency and Institution Participants

- CBLAD, DCR, DEQ, DOF, DHCD, VDOT, TAX, SLEAC, VDACS, DGIF, VDH, DOE,VA Coastal Resource Management Program
- Need to enhance local government/PDC participation and community partnerships.

C. Major Desired Outcomes

- Provision of adequate technical guidance and assistance to local governments and the land development industry to:
  - Modify development/redevelopment planning and practices.
  - Modify urban stormwater planning and practices.
  - Review of tax policies and their impacts on development decisions.
  - Publish document on ecologically based designs and development tools.
  - Encourage new development and redevelopment in areas supported by existing infrastructure.
  - Evaluate all existing local water quality protection programs and ensure they are being coordinated and applied effectively.
  - Identify and remove impediments to better site design and low impact development.
  - Rehabilitate and restore 1,050 brownfield sites.
  - Reduce the rate of harmful sprawl.

D. Approaches to Achieving Outcomes

- Participation in Bay Program.
- **Ongoing state programs**:
  - ***Regulatory Programs***:
    - The Bay Act;
    - Erosion and Sediment Control Law;
    - VPDES Phase I and Phase II permits;
    - TMDL compliance.
  - ***Voluntary/Incentive Programs:***
    - Watershed Planning;

        - Tributary Strategies;
        - Stormwater Management Law;
        - Open Space Preservation Initiatives—VLCF, CREP, VOF, WQIA, PDR's, easements, clustering provisions, etc.;
        - Urban Nutrient Management Planning;
        - Agriculture Plans;
        - Brownfields Program;
        - Enterprise Zones and other urban redevelopment programs;
        - Coastal Management Act;
        - GIS and modeling tools;
        - TMDL planning.
    - ***Promotional/ Educational and Outreach Activities:***
        - Technical assistance programs;
        - Educational programs;
        - Urban nutrient management programs (Bayscapes);
        - The cooperative watershed initiatives program;
        - Better Site Design;
        - Low Impact Development.

- **New Initiative: Utilize joint state agency team**
  Proposal: Group together C2K commitments that involve messages to and actions by local communities and governments.
    - Treat commitments involving local communities and governments as a group in order to:
        - Identify common functions;
        - Develop coordinated strategies and action plans to implementation of each function within a multi-agency group;
        - Prevent redundant or conflicting messages from being delivered to Virginia local governments and community organizations when various commitments involve similar messages, audiences and modes of delivery;
        - Take best advantage of the resources each agency can provide to support each commitment's implementation to optimize the use of available funding and staff.
    - Form an external advisory committee to provide feedback and help support VA's approach to commitments affecting local governments, watershed management and communities.

E. Status and Outlook - This section contains 13 commitments and is heavily connected to Watersheds and Community Engagement Subsections

- **Status:**
    - Awaiting definition and tracking system for harmful sprawl from Bay Program;
    - Bay Program Tax Policy Study will not be completed until late, 2003;
    - Awaiting impediments report from Bay Program;
    - Need technical assistance funds to conduct workshops, training, demonstration projects, etc to meet a number of commitments;
    - Identification of impediments-moving forward with Better Site Design Initiative;
    - Virginia Brownfield program-new legislation and MOA between DEQ and EPA-on track;
    - Local water quality program evaluation-on-going programs;
- **Challenges:**

  - Inter-agency coordination and fragmentation within state organizations and at Bay Program level.
  - Lack of resources
  - Local governments view as unfounded mandate
  - Removal of legislative, regulatory and policy impediments.
  - Working to achieve local government participation.
  - Effect change in local land use planning/development practices
  - Promote redevelopment within urbanized areas
  - Process will require time; changes will be incremental
- **Opportunities:**
  - Potential for new framework to achieve strategies and action plans—more successfully influence local planning and development practices.
  - Working better and smarter to overcome a lack of resources.
  - End result of all commitments under Sound Land Use section could achieve an overall reduction of harmful sprawl everywhere (not just on agricultural and forested lands).
  - Improved coordination among state agencies.
  - Connections/leveraging of Local Government Participation Action Plan.

SUBSECTION 4.3
TRANSPORTATION

A. Major Issues Addressed by the Subsection

- Improve the coordination of transportation and land use planning with an intermodal focus, promote redevelopment, and encourage the use clean vehicle and stormwater management technologies

B. State Agency and Institution Participants

- VDOT, CBLAD, DEQ, DGS and Local Government

C. Major Desired Outcomes

- Improved coordination transportation and land use planning
- Promote revitalization existing communities and infrastructure
- Reduce the dependence on automobiles by incorporating travel alternatives
- Design projects to increase the availability of alternative travel modes
- Purchase easements to preserve resource lands adjacent to the rights of way
- Evaluate special efforts for stormwater management on transportation projects
- Establish policies and incentives to encourage the use of clean vehicles
- Promote transportation technologies that reduce emissions.

D. Approaches to Achieving Outcomes

- Document and evaluate the current policies and programs of DOTs, Metropolitan Planning Organizations, federal, regional, state, and local entities
- Identify opportunities for actions at the regional, state, and local levels
- Synthesize the current research on policies and programs
- Identify Funding Sources

E. Status and Outlook

- Recent legislation: HB771 (Statewide Plan) and HB290 (Intermodal Office) were both passed by the General Assembly, and signed by the Governor. They became affective on July 1, 2002. These pieces of legislation directly impact development of the Statewide Plan.
- Compile transportation information for activities and research on the integration of transportation and land use planning.
- Develop a tool kit of innovative practices for integrating transportation and land use planning
- Identify gaps in the existing funding programs and compile list of funding sources
- Search/Survey organizations that promote non-auto transportation to identify effective strategies for reducing dependency on automobiles.
- Identify research needs and identify opportunities for research through organizations such as TRB, AASHTO, etc. for stormwater management technologies.

SUBSECTION 4.4
PUBLIC ACCESS

A. Major Issues Addressed by the Subsection

- Expand public access points by 30% by 2010.
- Base figure is 619 sites in the 2000 Chesapeake Bay Pubic Access Guide.
- 219 sites are identified in Virginia.
- Increase designated number of water trails in Bay Region by 500 miles by 2005.
- Enhance interpretive materials at pubic access points.
- By 2003, develop partnerships with at least 30 sites to enhance place-based interpretation.

B. State Agency and Institution Participants

- DCR, DGIF, VMRC.
- Local Park and Recreation Departments.
- National Park Service Gateways Program.
- Federal Land Managers in Virginia.
- Military Installations.
- National Park Service units.
- U. S. Fish and Wildlife Refuges.

C. Major Desired Outcomes

- Virginia's share of new or enhanced sites = 66 sites by 2010.
- Boating access.
- Fishing areas, bank or piers.
- Beach areas.
- Natural areas.
- Virginia share of new water trail miles = 200 miles.
- 123 miles completed.
- Over 200 miles under development in Virginia.
- Other commitments are on going and have been met.

D. Approaches to Achieving Outcomes

- Seek additional funding sources in Bay Region.
- 2002 VOP has numerous recommendations to encourage access and trail development.
- Available grant funds give priority to projects that include access.
- Seek new partnerships to increase / enhance access sites/ interpretation.
- Federal land managers encouraged to provide additional access opportunities.
- Reclaim orphaned sites or brownfields to include access.
- Provide enhanced interpretive information at public access sites.

E. Status and Outlook

- **Status**: <u>30% increase in sites</u>
  - Virginia will need to develop 66 new/enhanced sites by 2010
- **Outlook**:
  - Population in Bay region will reach 16.8 million by 2010.
  - Virginia population in the Bay region will be about 5.9 million, with 75% within 1 hour of the Bay.
  - New or enhanced access is not keeping pace with that growth rate.
  - Virginia added 10 new access sites in the Bay region during 2001 and 2002. Need at least 6 new sites per year to meet the commitment.
  - Projected new acquisitions and developments probably will not meet the target of 6/year in 2003; therefore, we are falling further behind.
  - DGIF and VMRC are having extreme difficulty locating new sites that are suitable for access and affordable.
  - Increased federal participation could help meet the goal.
  - Increased levels of funding and local/state/federal partnerships will be necessary in order to meet the improved access goal.
- **Status**: <u>500 miles of new water trail</u>
- **Outlook**:
  - Virginia added 72 miles of water trail during 2002, bringing total new miles developed in Virginia to 197 miles (125 miles added in 2001).
  - Other segments totaling over 100 miles are under development and will be completed by 2003, meeting Virginia's target. (The Bay region has now exceeded the goal-732 miles were added this year bringing the total to 1394 miles of water trail in the Bay region).
  - Additional segments are in planning and early development phase.
  - Interest at the local level and among private "river groups" is strong- some local governments see water trails as an eco-tourism opportunity.
- **Status**: <u>Enhance interpretive material at access points</u>
- **Outlook**:

- This is an ongoing process that is being met at individual sites at the local, state, and federal level, as well as non-profit organizations through the Gateways program, State, and local parks and other coordinated efforts.
- **Status**: Develop partnerships with at least 30 sites to enhance place-based interpretation
- **Outlook**:
  - Being met through Gateways program. As of July 2002 there are 38 designated Gateway sites in VA (108 in the Bay Region) The goal of 30 new sites has already been achieved and interest in the program continues to grow.

SUBSECTION 5.1
EDUCATION AND OUTREACH

A. Major Issues Addressed by the Subsection

- Make public outreach a Bay Program priority.
- Provide a Bay and watershed focus for the basin's K-12 schools.

B. State Agency and Institution Participants

- DCR, DEQ, Department of Education have representatives on the CBP Communication and Education Subcommittee (CESC).
- DGIF, VIMS, VCE involved as members of the Virginia Resource Use Education Council

C. Major Desired Outcomes

- An individual stewardship mass media campaign in the basin's major markets.
  - Audiences, messages, etc. determined using results from public perception survey released October 2002.
  - A fulfillment component supported by the different jurisdictions.
- Continue working with Departments of Education to incorporate Bay messages into schools.
  - Commitment calling for "meaningful outdoor Bay or stream experience" by 2005 to be driving force; in Virginia expand concept statewide.
  - Develop teacher training and instructional materials correlated to SOLs as initial implementation steps.
  - Provide funding/opportunities to schools for field trips.

D. Approaches to Achieving Outcomes

- BSC has provided funding to hire consultant to implement campaign contingent on matching funds from the jurisdictions.
  - CESC/jurisdictions fell short of reaching financial for basin-wide campaign.
  - Given budget constraints, CESC is proposing a pilot media campaign in the Washington D.C. market.
  - Survey results completed for CBP by CMI-Va. Tech; survey executive summary attached.

- CBP has developed a Meaningful Experience guidance document; Virginia is developing Meaningful Experience implementation plan. BSC deferred FY 02 funding of teacher training and implementation to NOAA grant program. BSC being asked to reconsider for FY 03.
  - Teacher training has been deemed the next critical step in implementation.
  - NOAA has committed nearly $1 million to implementation of this commitment. Virginia received NOAA grant for teacher training. None of the jurisdictions' Departments of Education received NOAA funding for implementation. State representatives are working with NOAA to try and rectify this in future grant cycles.

E. Status and Outlook

- Mass media campaign:
  - VA has committed $150,000 from FY03 EPA Chesapeake Bay Implementation grant to campaign; MD has proposed $150,000 match.
  - CESC proposing a $400,000 - $550,000 campaign in the Washington D.C. market. Asking other jurisdictions to provide in-kind services (fulfillment pieces, postage). Virginia supports this proposal.
  - The D.C./Northern Virginia market is the largest, most important market for Virginia.
- Meaningful experience:
  - Virginia is conducting its initial round of teacher training in fall of 2002; presentations have been made to major teacher and principals' conferences.
  - VDOE has developed instructional materials that support the meaningful experience and correlate to Standards of Learning.
  - Virginia will submit an RFP to NOAA for additional teacher training and implementation funds in 2004.
  - Virginia has developed a mini-grant program to provide teacher training and implementation money directly to schools using Chesapeake Bay Implementation Grant (CBIG) and the private sector funds. CBIG funding is committed for 2002 and 2003. A NOAA grant for this project was rejected. The grant program goes beyond the Bay watershed and is available statewide.

SUBSECTION 5.2
COMMUNITY ENGAGEMENT

A. Major Issues Addressed by the Subsection

- Forge partnerships.
- Local watershed management plans, addressing:
  - Wetlands
  - Forested buffers
  - Stream corridors
  - Public access
- Increase community awareness and involvement.

B. State Agency and Institution Participants

- DCR, CBLAD, DEQ, DGIF and DOF.

C. Major Desired Outcomes

- Virginia to work closely with local governments:
  - To identify small watersheds where community-based actions are essential to meeting Bay restoration goals.
  - To bring Bay program resources to these communities.
  - Enhance funding for locally based programs.
  - Clearinghouse of information on local watershed restoration efforts.
  - Provide easily accessible information suitable for analyzing environmental conditions at small watershed scale.
  - Revise Chesapeake Bay Local Government Participation Action Plan.
  - Full implementation of Local Government Participation Action Plan.

D. Approaches to Achieving Outcomes

- Use regional staff to:
  - Establish local relationships.
  - Establish communication on watershed level.
  - Analyze needs within watershed.
- Focus on small watershed management planning (Subsection 2.2).
- Technical guides.
- Support Local Government Participation Action Plan.
- Build effective public relations strategies on C2K objectives.
- Supplement local engagement efforts with Mass Media Campaign.

E. Status and Outlook

- DCR has hired regional Watershed Field Coordinators (7) and CBLAD local liaisons.
- Supporting community watershed organizations.
- Developing C2K implementation tracking database.
- Providing 'minigrants' to support implementation.
- Revised CBPA technical assistance implementation manual (addressing buffers, silviculture, exceptions, etc.) should be available in late 2002.
- Need to express initiative in terms of benefits to local governments.
- Requires extensive communication for success.
- Current state capacity overwhelmed.
- Expand Virginia taskforce to address all C2K commitments affecting local governments and community watershed organizations, in an effort to more effectively target and develop outreach strategy.

SUBSECTION 5.3
GOVERNMENT BY EXAMPLE

A. Major Issues Addressed by the Subsection

- Only state government signed the 2000 Bay Agreement.
- Agreement calls for major efforts by local governments and others.
- Agreement voluntary and funds inadequate.
- State often perceived as not doing its share.
- Need for additional evidence of state commitment.

B. State Agency and Institution Participants

- All state agencies occupy space and use resources.
- Major state facilities and lands will be focus of any systematic effort.

C. Major Desired Outcomes

- Management of state facilities and lands and the design and construction of state-funded development and redevelopment projects consistent with Bay agreement.
- Increased clean fuel technology in state vehicle fleets.
- Better management of nutrients, sediments and chemical contaminants in stormwater runoff.

D. Approaches to Achieving Outcomes

- Individual agency efforts.
- Executive orders and other efforts focused on state agencies.

E. Status and Outlook

- Clean vehicles technology and fuels for state vehicle fleets:
  - 325 of 3,700 state vehicles are alternative fuel capable (compressed gas).
  - Beginning in 2002, 75% of state vehicles purchased in NoVA, Richmond and Hampton Roads areas will support flex-fuels (ethanol/methanol).
  - VDOT Hampton Roads District is piloting use of bio-diesel (soy blend) to cut emissions.
- Stormwater management:
  - CBP Executive Council Directive signed in December 2001.
  - State agencies in early stage of responding to that Directive.
- The major commitment in this subsection calls for processes to be put in place by 2002 to ensure that state properties are developed, redeveloped and used in a manner consistent with relevant goals, etc. of the Bay agreement. Further, that the design and construction of state-funded development and redevelopment projects also are consistent. A group of representatives from state agencies currently are reviewing existing state processes and programs to determine the extent to which they support this approach. A report and recommendations will be made to the Secretary of Natural Resources.

SUBSECTION 5.4
PARTNERSHIPS

A. Major Issues Addressed by the Subsection

- Bay agreement does not cover Bay basin/watershed:
  - Watershed/basin = 64,000 sq. miles.
  - Bay agreement jurisdictions govern 82%.
  - "Non-signatories" govern remaining 18% (WVA=10%, NY=7%, DE=1%).
- Need to involve upstream states in selected efforts, such as Nutrient and Sediment reduction, and possibly fish passage, animal waste transfer, etc., as well.
- Difficulty in determining how to:
  - Involve non-signatory states in CBP process and structure.
  - Share limited CBP funds.

B. State Agency and Institution Participants

- Water Quality Steering Committee: DEQ and DCR.
- Other state participants.

C. Major Desired Outcomes

- Improved two-way communication.
- Agreements on specific issues of mutual interest.

D. Approaches to Achieving Outcomes

- Provide basin-wide perspective in Bay Journal, etc.
- Issue general invitations to participate in CBP process.
- Hold regional conferences, workshops, etc.
- Establish special purpose basin-wide work groups.
- Expand congressional base and funding.

E. Status and Outlook

- Upstream states essential to delisting the Bay and the tidal tributaries:
  - A committee to coordinate this effort among the Bay agreement partners (DC, MD, PA, VA, Ches, Bay Commission and EPA) and the upstream states (WV, NY, and DE) was established in 2001.
  - All the above have now signed an MOU formally recognizing this relationship.
- Systematic, coordinated efforts are being made to have Congress expand a range of bills (Farm Act, etc.) in ways that will help support Bay restoration.

III. Local Governments and the Bay Agreement

Local governments are central to the successful implementation of many of the most significant individual commitments in the C2K Agreement. In the last annual report a summary was given of a survey of local government activities that contribute to the implementation of the agreement. State staff conducted that survey.

This year the Planning District Commissions of local governments that fall entirely or largely within the Chesapeake Bay watershed conducted a survey. Staff of the Hampton Roads Planning District Commission coordinated that effort, and the report from the PDCs follows below.

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According to a number of sources, at least one-third of the commitments in the C2K Agreement will require local government implementation if the commitments are to be achieved. Most of the remaining commitments will have either a direct or an indirect impact on local government operations. The critical nature of local government implementation is recognized in the revised *Chesapeake Bay Local Government Participation Action Plan*. The following is a list of routine activities undertaken by local governments that contribute to implementation of the C2K Agreement:

- Meeting the provisions of the Chesapeake Bay Preservation Act where appropriate.
- Meeting the provisions of the State Erosion and sediment control Act.

- Meeting DEQ permit requirements such as complying with sewage treatment plant effluent limitations and other regulated discharges.
- Complying with Safe Drinking Water Act provisions.
- Meeting provisions of the Virginia wetlands programs.
- Carrying out floodplain management
- Adopting and implementing stormwater management measures.
- Conducting activities in cooperation with the local Soil and Water Conservation Districts.
- Education and outreach to the public in general or to targeted groups, such as the development community.

In 2001, all cities, counties and towns with land area in the Chesapeake Bay Watershed were surveyed directly to determine their involvement in the commitments contained in the C2K Agreement. For each commitment (51), localities were requested to indicate whether they (a) already had in place; (b) did not have in place; or (c) anticipated putting in place or expanding, programs or activities directed at the commitment. They were also requested to provide additional comments on their implementation activities, including highlights of their programs. For 2002, localities were again surveyed to determine their implementation activities.

The 2002 survey was conducted through the fifteen Planning District Commissions that fall entirely or partially within the Watershed. The PDCs worked with their member localities to update the 2001 survey information or to complete a survey where one had not been completed in 2001. Due to a variety of factors, survey results are not directly comparable over the two years. All localities that completed surveys in 2001 did not respond to the 2002 survey, while at least a few of the 2002 respondents had not completed the 2001 survey. It has been assumed that localities that did not complete the survey in 2002 had not added or subtracted any implementation activities addressing the commitments.

Despite these limitations, the two surveys indicate a substantial amount of local government activity that involves direct or indirect implementation of the commitments contained in the C2K Agreement. When combined, a total of one hundred thirty-one (131) localities or two-thirds (67%) of the localities in the watershed completed the survey. Essentially all localities were doing something that related to the commitments. The two surveys provide a baseline of information that can be used in measuring progress toward achievement of the commitments. The survey information could also be used in targeting state financial and technical assistance programs geographically as well as programmatically.

Based on the 2002 Survey results, most C2K commitments continue to receive some implementation activity from some localities and it appears that an increasing number of localities are considering programs that could assist in achieving the commitments. Some of the smaller towns in the watershed are exceptions to this general assessment. Although survey responses do not confirm this assumption, the smaller towns may be covered through programs being operated by the surrounding county. There are 37 commitments where the majority of local governments responding to the 2002 survey indicate that they have no program in place to address the commitment. There are four commitments where a majority of the respondents indicate that a program is being implemented. They are:

- Programs that encourage the concentration of new development in areas supported by adequate water resources and infrastructure.

- Programs and policies to ensure local government properties are operated in a manner consistent with Bay objectives, to include the use of clean fuels, implementation of stormwater management, and sensitive site measures.
- Engagement in watershed management.
- Incorporation of wetlands preservation goals and policies into existing planning documents.

Commitments where nearly 50% of the local governments indicate that programs are in place include:

- Outreach to the development community on sound land use policies.
- Programs to promote designs that limit impervious cover or reduce the impacts of impervious cover.
- Improved coordination of transportation and land use planning to encourage compact, mixed-use development patterns and revitalization programs.
- Programs that promote alternative modes of transportation.
- Programs designed to increase public awareness of the Bay and Bay restoration efforts.
- Programs that enable and encourage community-based action to protect and improve wetlands, forested buffers, stream corridors and public access.

These results are similar to the 2001 survey and indicate that local governments are maintaining and, in some cases, increasing their level of activity related to the commitments.

Areas of the C2K Agreement that see relatively little local government implementation activity, based on the survey, are those that involve substantial financial commitment, such as land acquisition, and those that fall outside the traditional purview of local governments such as management of fisheries, and other aquatic resources that are generally managed directly by state agencies and the private sector. An exception to the latter is the commitment to restore oyster populations, where several localities have established oyster restoration programs.

Local governments were also requested to describe highlights of their programs. Many of the highlighted programs involved watershed management planning, whether through various water quality programs, such as tributary strategies or TMDL development, or as means of protecting potable water supplies. Several localities indicated that they were developing individually or regionally plans for Greenway/Blueway development. As these plans move forward, it is likely that commitments dealing with establishment of water trails, stream corridor restoration and public access will have increased local government implementation activity. Many localities also pointed out that they were involved in, or exploring the development of, cooperative public awareness programs, focusing on stormwater management, water supply protection and related issues. While not specific to the C2K commitments, such programs may be cost-effective solutions to the commitments. Finally, a number of localities indicated that they were developing individual or cooperative approaches to implementing the new Stormwater Permit requirements for smaller localities (Phase II).

During 2002, the fifteen Planning District Commissions in the Chesapeake Bay Watershed were also requested to develop recommendations on state priorities for implementation of the C2K commitments. In developing these recommendations, the PDCs addressed the twenty-two primary subcategories in the C2K Agreement. Since local governments were generally involved in the determination of these recommendations, the priority recommendations are an indicator of areas where additional state and federal assistance to local governments may have a positive

impact on achievement of the Agreement. Based on the consensus of the PDCs, the following commitments are recommended as the top priorities for C2K Agreement implementation:

- Watersheds
- Education and Outreach
- Nutrients and Sediment
- Land Conservation
- Development, Redevelopment and Revitalization
- Crabs
- Oysters
- Transportation
- Public Access
- Forests
- Government by Example

Most of these priorities fall within the traditional purview of local government planning, regulation and operational responsibilities. With few exceptions, they are also the elements of the C2K Agreement that local governments indicate that they either have or anticipate pursuing implementation activities. In a few cases, the priorities reflect commitments that have a direct relationship to the economies of key portions of the Bay Watershed.

General comments from local governments, in response to the survey, focus on the need for improved communication about the Chesapeake Bay Watershed and the Agreement and the need for additional resources and authorities to support implementation activities. Several localities suggested that future surveys be integrated with other reporting requirements to reduce paperwork commitments. In the western portions of the Watershed, local governments indicate strongly that the focus needs to be on watershed planning and management and less on the Chesapeake Bay itself. They indicated that this focus would be more supportable by their citizens. Several Tidewater localities indicated a similar belief that a focus on local watersheds, rather than the Bay itself, is an easier way to elicit public support for the efforts. This underscores the importance of local watersheds and also the need for improved communication. The theme of enhanced communication about the Watershed echoes a central theme of focus groups held with local government officials in 2001 to generate recommendations on the content and utility of the *Chesapeake Bay Local Government Participation Action Plan*, which was approved by the Chesapeake Executive Council in October 2002.

One last theme that appeared in local government comments on the survey and in related discussions was the need for and value of cooperation in meeting the commitments. A number of localities are either participating in or developing cooperative programs that address commitments such as stormwater management, watershed management and planning, tributary strategies, citizen awareness and involvement. These programs involve groups of localities and partnerships among localities, Soil and Water Conservation Districts and the private sector. These partnership and cooperative approaches are cost-effective means of addressing the commitments in the C2K Agreement, especially in periods of tight resources.

PART THREE
Virginia's Tributary Strategy Program

I. Background and Overview

A. Background

For over ten years Virginia has worked to develop and implement water quality plans, known as tributary nutrient reduction strategies, for each main tributary river to the Chesapeake Bay and also for the smaller creeks of the Eastern Shore. These strategies have their beginnings in the Chesapeake Bay Program and the scientific research that identified excess nutrients (nitrogen and phosphorus) as the greatest water quality problem faced by Chesapeake Bay and its tributaries.

Virginia's tributary strategies are based on a cooperative, rather than regulatory, approach to restoring water quality. In developing these strategies, Virginia's Natural Resources agencies worked closely with local governments, farmers, conservation groups, wastewater treatment plant operators and other citizens who all have an important stake in ensuring clean water in their community. This locally based approach helped the Commonwealth and its citizens craft tributary strategies that were rooted in practical methods and effective solutions.

These strategies are also intended to achieve equity among point sources of nutrients (i.e., wastewater treatment plants) and nonpoint sources, which include runoff from urban, agricultural and residential areas.

B. Tributary Strategy Development

The first tributary strategy to be developed was the *Shenandoah and Potomac River Basins Tributary Nutrient Reduction Strategy*, completed in late 1996. This *Strategy* was designed to achieve the 40% nutrient reduction goal agreed to by the Bay Program partners, and it established a template for other strategies that followed. It also served as the major impetus for the passage of the Water Quality Improvement Act by the 1997 General Assembly. The WQIA is one of Virginia's most important tools for funding and implementing the conservation practices identified in tributary strategies.

The *Shenandoah and Potomac Tributary Strategy* was followed three years later with the completion of tributary strategies for the *Rappahannock River Basin and Northern Neck Coastal Basins*, the *York River Basin and Middle Peninsula Coastal Basins* and the western portion (draining to the Chesapeake Bay) of the *Eastern Shore*. In addition, a final goal-setting document was completed for the *James River Basin*. These strategies were developed with strong local leadership and reflected the desires of involved citizens to substantially restore and protect the quality of their local waterways by 2005-2010.

Unlike the *Shenandoah and Potomac Tributary Strategy*, these strategies also included reduction goal for annual loads of sediment that enter each tributary. These goals reflected recent scientific understanding that, in certain waters, sediment levels and resulting turbidity have as great of an impact on water quality as excess nutrient levels.

C. Status and Implementation

It is difficult to accurately track nutrient loads and reductions across an entire river basin, mostly due to the effect that climactic variability has on nonpoint source nutrient loads. However, current information indicates that Virginia has implemented all the nonpoint source control best

management practices identified in the *Shenandoah and Potomac Tributary Strategy*. Point source retrofit projects to install nutrient reduction systems are continuing across the Bay watershed, and several are now on-line and achieving better than expected nitrogen and phosphorus removal rates.

For the other tributary strategies, their goal deadlines range between 2005 and 2010. Progress has been made toward the nutrient and sediment reduction goals of these strategies; however, substantial further reductions will be needed in each of these basins to achieve their respective reduction goals.

D. Next Steps: Achieving Environmental Endpoints through Goal Reevaluation, Strategy Revision and Full Implementation

In 1998, the US Environmental Protection Agency placed Virginia's portion of the Chesapeake Bay and most of its tidal tributaries on the Section 303 (d) Impaired Waters List (TMDL List). As a result, Virginia and her Bay Program partners were faced with a potential overlap between a regulatory program and their ongoing tributary nutrient reduction strategies. Prior to the signing of the Chesapeake 2000 Agreement, a process was agreed upon that gave the Chesapeake Bay Program partners ten years, until 2010, to bring the main stem of the Bay and tributaries in compliance with water quality standards, before regulatory TMDL requirements would be invoked.

This effort is designed to integrate the regulatory and cooperative programs for restoring Bay water quality. As detailed in the Chesapeake 2000 Agreement, the plan is to revise existing water quality standards to more accurately reflect natural conditions and habitat variability among types of waters (and also seasons) and to determine new reduction goals that would achieve these standards for their respective locations and times.

The process, often referred to as the Chesapeake Bay Environmental Endpoints process, includes a number of steps for developing new water quality standards, as defined in the Clean Water Act. Draft Criteria for dissolved oxygen, water clarity and chlorophyll have been developed and offered to the public for three rounds of review. Draft Designated Uses have also been developed which define how, where and when these criteria will apply. In conjunction with a Use Attainability Analysis, these steps will lead to revised or new State Water Quality Standards, new nutrient and sediment reduction goals and revised tributary strategies. A short public information bulletin on the Endpoints process appears in Appendix B.

The proposed water quality criteria and designated uses are scheduled for publication by EPA Region III in April 2003. The States' with tidal waters will then carry out the regulatory adoption process to add these to their water quality standards. This process includes a comprehensive public participation element, and will require a major effort on the part of Natural Resources agencies, local governments, agricultural groups, conservation organizations and other parties involved with Virginia's tributary strategy initiatives. Along with the proposed criteria and designated uses, revised tributary nutrient and sediment load allocations will be determined. These "C2K allocations" will be used as the starting point for revising the tributary strategies, but it must be recognized that final load allocations will not be set for the Bay tributaries until the water quality standards adoption process has been completed. However, it is expected that the new nutrient reduction goals for each tributary basin will be significantly more challenging than existing goals reflected in their respective strategies. Therefore, implementation rates required to achieve these goals by the year 2010 will be even more challenging.

II. Shenandoah – Potomac Tributary Nutrient Reduction Strategy

The goal of the Shenandoah-Potomac Tributary Nutrient Reduction Strategy was to achieve a 40% reduction (relative to a 1985 baseline) in controllable phosphorus and nitrogen loads to the Potomac River by the end of the year 2000. This goal was shared among the Potomac River basin and all tributary basins to the north of the Potomac in the states of Maryland and Pennsylvania. This goal was established using scientific data from the Chesapeake Bay Water Quality Model, which was used to predict that dissolved oxygen levels in the main stem of the Bay would improve by approximately 25% and that water quality within individual tributaries would also benefit.

In the Shenandoah region, significant progress has been made in controlling point source nutrient loads through Water Quality Improvement Fund grant projects. During 2001, installation of a biological nutrient reduction (BNR) system was substantially complete at the Augusta County Service Authority's Stuarts Draft plant, and partial utilization of the process was achieved. The City of Staunton brought their BNR system on-line at the Middle River wastewater facility.

Two of the Shenandoah Valley's largest municipal wastewater plants continued operation of their BNR processes. The Frederick-Winchester Service Authority's Opequon plant exceeded the performance requirements for nutrient reduction, producing annual effluent concentrations of 4.01 mg/l for nitrogen and 0.14 mg/l for phosphorus. The Harrisonburg-Rockingham Regional Service Authority's North River plant also performed better than expected, with annual effluent levels of 7.74 mg/l for nitrogen and 1.21 mg/l for phosphorus. Reductions beyond the performance requirements are mostly due to the fact that both plants are operating well below their rated hydraulic capacity, and are therefore underloaded. Unfortunately, another project, the SIL Modular Reclamation Reuse System in the Timberville area, did not meet its performance requirements for the year, and a monetary assessment has been issued for repayment of a portion of the grant.

Potomac Watershed Roundtable - Since its formation in August 2000, the Potomac Watershed Roundtable has made significant contributions to addressing issues affecting Virginia's portion of the Potomac watershed. Through its five active working groups and appointed special committees the Roundtable has dealt with specific issues, such as development of Total Maximum Daily Loads (TMDLs) for impaired waters, and the implementation of erosion and sediment control and stormwater programs. In addition, the Roundtable organized meetings on topics such as urban best management practices, funding opportunities for watershed projects, and agricultural land preservation. The Roundtable has also worked with the DCR Potomac Watershed Office to focus efforts toward nutrient management on urban turf areas such as roadsides, home lawns, golf courses, and office parks. The Roundtable and DCR's Potomac Watershed Office are working cooperatively to educate individuals who manage these turf areas about improving water quality through fertilizer management decisions.

Potomac region point sources have also contributed to the progress made in controlling nutrient loads. The Alexandria Sanitation Authority's BNR project is about 85% constructed and should be completed in January 2003. The Arlington County plant upgrade project is about 95% complete, and BNR facilities went online in mid-2002. At the Dale Service Corporation's two plants in Prince William County, construction is 95% complete and BNR start-up is expected in December 2002.

BNR installation at Fairfax County's Noman Cole plant was substantially complete in mid-2002, and the system went on-line in September 2002. Leesburg's BNR process has been on-line since

early 2001, and achieved annual average effluent levels of 8.27 mg/l for nitrogen, and 1.34 mg/l for phosphorus with only 9 months of operation that year.

BNR construction is about 55% complete at Prince William County's H. L. Mooney plant, and is now operating partially in a BNR mode. Methanol facilities and four of five aeration basins and clarifiers are online; the remaining unit processes are expected to be complete by January 2003. The new Purcellville wastewater plant came online late in 2001, and this replacement facility included BNR in its design.

III. Tributary Restoration Strategy for the Rappahannock River and Northern Neck Coastal Basins

The Tributary Restoration Strategy for the Rappahannock River and Northern Neck Coastal Basins ("Rappahannock Strategy") was completed and approved in August 2000. The Rappahannock Strategy sets nutrient and sediment reduction goals at 6.9 million pounds of nitrogen, 663,000 pounds of phosphorus, and 289,000 tons of sediment based on 1996 levels. These nutrient and sediment reductions are projected to reduce anoxic water by 50% and to increase the density of submerged aquatic grasses by 50%. Nonpoint sources account for over 90% of total nutrient loads and 100% of sediment loads; the majority of this is a result of agricultural activities.

Total implementation costs have been estimated at $48 million. Approximately $39 million of that is needed for nonpoint source measures, mostly agricultural, and for technical assistance to SWCDs. The remaining $9 million is needed to improve point source facilities. During FY01, the Rappahannock basin received approximately $1.1 million in total agricultural cost-share funds. Point source WQIF grants will improve the level of biological nutrient removal at several major wastewater treatment facilities. In addition, urban sources were identified as a significant contributor of nonpoint source pollution in the Rappahannock. However, due to unknown urban BMP load reductions and associated costs, specific urban control measures and their costs were not included in the *Rappahannock Strategy*.

The Rappahannock River Basin Summit, co-sponsored by the Rappahannock River Basin Commission and the Rappahannock Conservation Council, held its Fifth Annual Summit this year. Using the theme, “One Person Does Make a Difference”, the summit increased stakeholder awareness on water resource issues in the Rappahannock through presentations on water supply planning, low impact development designs and retrofits, and citizen involvement in reducing nonpoint source pollution.

Workgroups established during the 2000 Summit have continued to be very productive. The Agriculture and Forestry Workgroup has held workshops for realtors teaching them about best management practices to look for when dealing with large pieces of property, and created a *Farm and Consumer Resource* booklet that lists all contacts for conservation practices in the Rappahannock River Basin. The Urban Workgroup hosted a workshop on erosion and sediment control and stormwater management programs, and created an informational booklet with erosion and sediment control program information and workload analysis for each county. The Public Relations and Outreach Workgroup has been supporting the other workgroups projects and recently will be focusing on projects specific to the Chesapeake Bay 2000 Agreement.

The Rappahannock River mini-grants provided funding for water quality monitoring, the introduction of watershed awareness and education in schools, and stream restoration.

Workshops were also funded to educate citizens on low impact development, watershed assessment and stream restoration, and resource materials to assist local governments in using low impact development strategies were developed.

Several Rappahannock basin point source facilities have been active in the effort to reduce nutrient loads. Fauquier County plans to design and install year-round nutrient removal facilities at their Remington plant. Spotsylvania County began design of a BNR process for the FMC plant, and construction of a nutrient control system at their Massaponax plant is about 75% complete, with this system expected to be on-line by January 2003. In Stafford County, BNR installation at the Little Falls Run plant is about 90% finished, and the system should complete and online by December 2002. The City of Fredericksburg continues to operate an oxidation ditch system capable of nutrient reduction. The Town of Tappahanock completed installation of a new treatment process that can reduce nutrient loads, and began operating the facility in the latter part of 2001.

IV. York River and Lower Coastal Basins Tributary Nutrient Reduction Strategy

The *York River and Lower Coastal Basins Tributary Nutrient Reduction Strategy* ("*York Strategy"*) was completed in February 2000. The *York Strategy* has goals to reduce nitrogen by 2.3 million pounds, phosphorus by 60,000 pounds, and sediment by 9,000 tons from 1996-97 levels. Once achieved, these reductions are projected to result in a 47% decrease in the volume of anoxic water, and a 39% increase in submerged aquatic vegetation (SAV) density, compared to 1985 levels in the York River and Lower Coastal watershed. Nonpoint sources account for approximately 80% of the nutrient loads entering the tidal tributary and 100% of the sediment load.

Costs to implement the *York Strategy* have been estimated at $45 million through 2010, including five additional full-time personnel among the seven Soil and Water Conservation Districts in the watershed. Of that total, a combined $25 million is needed for agricultural and urban nonpoint source pollution control measures and technical assistance to SWCDs. Agricultural cost-share funds in FY02 for *York Strategy* implementation were approximately $425,000, resulting in a reduction of over 8,000 pounds of phosphorus, over 45,000 pounds of nitrogen, and nearly 8,000 tons of sediment.

Municipal wastewater plants with a design flow capacity of one million gallons per day or more will be asked to voluntarily employ at least the Biological Nutrient Removal (BNR) level of treatment, and pollution prevention measures will be sought at industrial facilities by the Year 2010. A total estimated cost of $20 million is needed to improve all significant point source facilities in the basin to the BNR level of treatment.

Representatives from several state environmental agencies, Planning District Commissions, local governments, SWCDs, and some point sources in the York and Lower Coastal watersheds regularly attend the York Watershed Forum. The most recent Forum was held in June 2002 and focused on reviewing the Chesapeake Bay Water Quality Criteria and forming comments from the York Watershed Council and Forum members.

Implementation of the *York Strategy* is one of the focuses of the Forum. Individuals taking part in the Forum decided that the most productive way to address all of the issues in the Tributary Strategy was to form pertinent workgroups, where individuals interested in certain aspects could focus on specific water quality issues and/or programs within the basin. The five workgroups are

Laudable Landscapes, Public Involvement, York River Tributary Strategy Revision, Environmental Endpoints, and York Impaired Streams.

The Laudable Landscapes workgroup is working with organizations and agencies to identify critical areas for conservation. The Public Involvement workgroup is in the process of creating a database of audiences in the watershed and then will develop an education/outreach plan to target each of the groups. The purpose of the Tributary Strategy Revision workgroup is to identify and obtain the necessary data to facilitate the revision of the *York Strategy*. The Environmental Endpoints workgroup is tasked with reviewing the new Bay water quality criteria, to make recommendations, and to determine how to integrate these most effectively into the revised *Strategy*. The Impaired Streams workgroup is assembling a group of interested citizens to collect existing data from state and local agencies, to disseminate information to local landowners and local government, and to promote alternative sources of funding for needed restoration actions.

Once determined by the Bay states and the Chesapeake Bay Program, nutrient and sediment load allocations will be considered by the Forum for integration into the *York Strategy* in 2002, per the C2K Agreement. The revised *Strategy* will be the principal product of the Forum over the following year, with completion scheduled for 2003.

In 2003, implementation of the *York Strategy* will focus on the increased involvement by and collaboration with local governments. Several local erosion and sediment control programs have been reviewed this past year. Corrective actions local governments take to make their programs consistent will contribute to the goals of the *York Strategy*.

Nutrient control activities at wastewater plants in the York basin have been limited. However, the most notable of these are the reductions achieved by the single largest point source of nutrients in the basin, which is the St. Laurent Paper facility. Compared to a 1985 baseline, this plant has reduced their annual nitrogen load by 54% and the phosphorus load by 77%. Several municipal plants in the York basin have also significantly reduced their nutrient discharges, including HRSD-York, Gordonsville, West Point, and Ashland. In addition, Hanover County is building their new Totopotomoy plant, which will incorporate BNR in the treatment process.

V. James River Tributary Nutrient and Sediment Reduction Strategy

In August 2000, the Virginia Secretary of Natural Resources approved the document, *Tributary Strategy: Goals for Nutrient and Sediment Reduction in the James River*. The adopted goals for the *James River Strategy* are:

- Achieve a 9% sediment reduction from levels that existed in 1985 for the entire basin by the year 2010.

- For all areas draining directly to the tidal fresh portion of the James, Biological Nutrient Removal (BNR) implementation at point sources and an equivalent reduction in nonpoint sources by 2010. This would result in a 32% nitrogen and 39% phosphorus reduction, based on model simulation, in loading to the river from the levels that existed in 1985. Although the model simulation for this recommendation used a uniform BNR treatment level for all plants discharging to the tidal fresh portion, the overall objective is to achieve the recommended level of reduction in the aggregate point source load. This can be achieved with varying levels of nitrogen and phosphorus removal at the plants, with some operating more stringent treatment than others. This recognizes the varying capabilities

and site constraints at the plants, as well as opportunities to cost-effectively enhance treatment where feasible.

- The net nutrient loads to the lower estuary from all areas should not be allowed to increase and should be capped at 1996 levels. Growth in load coming from areas directly adjacent to the lower estuary should not exceed the reduced load coming from the tidal fresh portion of the river. The resultant zero net increase in loading to the lower estuary will prevent any degradation relative to current water quality conditions.

These goals are projected to result in an annual reduction of 13.2 million pounds of nitrogen, 2.4 million pounds of phosphorus, and 180,900 tons of sediments compared to 1985 levels. Living resource improvements associated with the reduction goals, as projected by the Chesapeake Bay Water Quality Model, are: submerged aquatic vegetation (SAV) growth in areas of the tidal fresh James previously identified by Virginia Institute of Marine Sciences (VIMS) as historic SAV beds; and substantial reductions in chlorophyll levels throughout the estuary. The estimated cost for these improvements is $164 million for point sources and $135 million for nonpoint source best management practices (BMP) implementation.

The *James River Strategy* goals will be revised starting in 2003 as part of the overall Chesapeake Bay Program Environmental Endpoints process, which is producing water quality criteria for dissolved oxygen, chlorophyll, and water clarity. The criteria are being used in conjunction with the Chesapeake Bay models to estimate the additional load reductions that will be needed by major Bay tributary for nitrogen, phosphorus, and sediment.

During this reporting period, Watershed Conservation Roundtables remained active in the Upper, Piedmont, and Lower portions of the James River basin. Steering Committees comprised of representatives of the Soil and Water Conservation Districts in the Upper and Piedmont portions of the basin provide leadership for the Roundtables. The Hampton Roads Planning District Commission serves as the coordinator for the Lower James Watershed Roundtable. Each of the three Roundtables met several times in 2002, providing continuing opportunities for stakeholders to raise nonpoint source pollution issues of concern, and to identify potential solutions tailored to each of the distinctive regions of the basin.

Substantial point source nutrient reductions have been achieved in the James River. Among the recent actions taken are:

- Clariant Corporation connected their process wastewater stream to HRSD's treatment system; thus, the facility is no longer considered a significant source of nutrients.
- Henrico County's WQIF project, adding BNR facilities in their expanded 75 MGD plant, is about 90% complete. Full-scale operation of the BNR plant is expected by mid-2003.
- Hopewell is installing nutrient removal facilities to achieve an annual average nitrogen effluent level of 21.0 mg/l, and is about 81% complete. The expected completion date for the project is February 2003.
- The Lexington-Rockbridge regional plant, a new facility that replaced an outdated system, has been reducing the load of nitrogen discharged since it came online.

VI. Eastern Shore Bay Coastal Tributary Nutrient Reduction Strategy

The ***Eastern Shore Coastal Basins Tributary Strategy*** (*Eastern Shore Strategy*) was completed in November 1999. The adopted goals are:

> **Living Resource Goal:** ***Increase the areas and density of Submerged Aquatic Vegetation throughout the Eastern Shore tidal creeks and embayments to historic levels to enable the return of abundant and diverse fish and shellfish populations, which in turn, will help to sustain and improve local economies.***
>
> **Nutrient Reduction Goal*: The nutrient reduction goal for the Eastern Shore Strategy has been identified as an interim goal for 2003. These reductions are linked to reasonable assurances of BMP implementation resulting in the following projected reductions by 2003: Nitrogen 22.4%; Phosphorus 41.8%; and Sediment 31.4%.***

Participants in the *Eastern Shore Strategy* development process included the following local officials and stakeholders: Northampton County, Accomack County, and the 15 towns in the Bay watershed, Eastern Shore Soil and Water Conservation District, Eastern Shore RC&D, Virginia Natural Resource Agencies, Natural Resource Conservation Service, Virginia Institute of Marine Science, Virginia Cooperative Extension, Eastern Shore Planning District Commission, agricultural producers, and local environmental organizations.

This diverse team was further expanded to include local educators, individual citizens and support organizations to include Save-Our-Streams, the Alliance for the Chesapeake Bay and the University of Virginia. This expansion was necessary to address the specific educational and local involvement needs of the *Strategy*. The team, now know as the Eastern Shore Watersheds Network, addressing issues both in the Bay and Atlantic watersheds, primarily focuses on the *Eastern Shore Strategy* , but also work on issues that are integrated with and ancillary to the process, thus allowing for a more comprehensive approach to restoring the coastal creeks and embayments.

Implementation of the *Eastern Shore Strategy* has been divided based on the respective goals for SAV and nutrients. A comprehensive monitoring plan has been underway for nearly three years and is culminating this year. The monitoring program, involving both contracted and citizen monitoring, is providing a baseline of information on SAV health and water quality within the small creeks and embayments along the Eastern Shore's Bay coastline. Based on these findings, an action plan will be developed to restore the SAV to historical levels as feasible. Resources committed over the last three years have been dedicated to the development the monitoring plan and its implementation.

The interim nutrient reduction goal is also a coordinated effort, primarily between conservation agencies on the Eastern Shore. The Eastern Shore Soil and Water Conservation District, through the Agricultural Cost Share program, has been aggressively implementing BMPs, which target the desired reductions. These efforts are coordinated and complimented by the locality efforts to improve Erosion and Sediment control compliance and the Planning District Commissions efforts to coordinate implementation of the Chesapeake Bay Preservation Act. The Eastern Shore Watershed Network is facilitating the communication and coordination of the efforts amongst agencies and organizations.

The long-term financial need for monitoring and BMP implementation remains at approximately $3 million. Additional funds will be required once monitoring data is collected for modeling and SAV restoration.

The *Eastern Shore Strategy* is an ongoing process. Coordinated efforts for the *Strategy* and other water quality initiatives have been greatly enhanced with the development of the Eastern Shore Watersheds Network. Through a more coordinated approach, funding needs and implementation actions can be prioritized based on a comprehensive watershed management approach. Commitment to the Eastern Shore Watershed Conservation partnership by Virginia's Natural Resource agencies is critical to the successful implementation of the *Eastern Shore Strategy*.

The most notable activity directed at reducing point source nutrient loads on the Eastern Shore was at Tyson's Food in Temperanceville. This facility completed installation of a chemical addition system, to meet a 2.0 mg/l monthly average phosphorus limit in their discharge permit. Discharge monitoring reporting should commence in late 2002.

Chesapeake Bay Program
A Watershed Partnership

CHESAPEAKE 2000

PREAMBLE

The Chesapeake Bay is North America's largest and most biologically diverse estuary, home to more than 3,600 species of plants, fish and animals. For more than 300 years, the Bay and its tributaries have sustained the region's economy and defined its traditions and culture. It is a resource of extraordinary productivity, worthy of the highest levels of protection and restoration.

Accordingly, in 1983 and 1987, the states of Virginia, Maryland, Pennsylvania, the District of Columbia, the Chesapeake Bay Commission and the U.S. Environmental Protection Agency, representing the federal government, signed historic agreements that established the Chesapeake Bay Program partnership to protect and restore the Chesapeake Bay's ecosystem.

For almost two decades, we, the signatories to these agreements, have worked together as stewards to ensure the public's right to clean water and a healthy and productive resource. We have sought to protect the health of the public that uses the Bay and consumes its bounty. The initiatives we have pursued have been deliberate and have produced significant results in the health and productivity of the Bay's main stem, the tributaries, and the natural land and water ecosystems that compose the Chesapeake Bay watershed.

While the individual and collective accomplishments of our efforts have been significant, even greater effort will be required to address the enormous challenges that lie ahead. Increased population and development within the watershed have created ever-greater challenges for us in the Bay's restoration. These challenges are further complicated by the dynamic nature of the Bay and the ever-changing global ecosystem with which it interacts.

In order to achieve our existing goals and meet the challenges that lie ahead, we must reaffirm our partnership and recommit to fulfilling the public responsibility we undertook almost two decades ago. We must manage for the future. We must have a vision for our desired destiny and put programs into place that will secure it.

To do this, there can be no greater goal in this recommitment than to engage everyone — individuals, businesses, schools and universities, communities and governments — in our effort. We must encourage all citizens of the Chesapeake Bay watershed to work toward a shared vision — a system with abundant, diverse populations of living resources, fed by healthy streams and rivers, sustaining strong local and regional economies, and our unique quality of life.

In affirming our recommitment through this new *Chesapeake 2000*, we recognize the importance of viewing this document in its entirety with no single part taken in isolation of the others. This Agreement reflects the Bay's complexity in that each action we take, like the elements of the Bay itself, is connected to all the others. This Agreement responds to the problems facing this magnificent ecosystem in a comprehensive, multifaceted way.

BY THIS AGREEMENT, we commit ourselves to nurture and sustain a Chesapeake Bay Watershed Partnership and to achieve the goals set forth in the subsequent sections. Without such a partnership, future challenges will not be met. With it, the restoration and protection of the Chesapeake Bay will be ensured for generations to come.

WE COMMIT TO:

LIVING RESOURCE PROTECTION AND RESTORATION

The health and vitality of the Chesapeake Bay's living resources provide the ultimate indicator of our success in the restoration and protection effort. The Bay's fisheries and the other living resources that sustain them and provide habitat for them are central to the initiatives we undertake in this Agreement.

We recognize the interconnectedness of the Bay's living resources and the importance of protecting the entire natural system. Therefore, we commit to identify the essential elements of habitat and environmental quality necessary to support the living resources of the Bay. In protecting commercially valuable species, we will manage harvest levels with precaution to maintain their health and stability and protect the ecosystem as a whole. We will restore passage for migratory fish and work to ensure that suitable water quality conditions exist in the upstream spawning habitats upon which they depend.

Our actions must be conducted in an integrated and coordinated manner. They must be continually monitored, evaluated and revised to adjust to the dynamic nature and complexities of the Chesapeake Bay and changes in global ecosystems. To advance this ecosystem approach, we will broaden our management perspective from single-system to ecosystem functions and will expand our protection efforts by shifting from single-species to multi-species management. We will also undertake efforts to determine how future conditions and changes in the chemical, physical and biological attributes of the Bay will affect living resources over time.

GOAL

Restore, enhance and protect the finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem.

Oysters

- By 2010, achieve, at a minimum, a tenfold increase in native oysters in the Chesapeake Bay, based upon a 1994 baseline. By 2002, develop and implement a strategy to achieve this increase by using sanctuaries sufficient in size and distribution, aquaculture, continued disease research and disease-resistant management strategies, and other management approaches.

Exotic Species

- In 2000, establish a Chesapeake Bay Program Task Force to:
  1. Work cooperatively with the U.S. Coast Guard, the ports, the shipping industry, environmental interests and others at the national level to help establish and implement a national program designed to substantially reduce and, where possible, eliminate the introduction of non-native species carried in ballast water; and
  2. By 2002, develop and implement an interim voluntary ballast water management program for the waters of the Bay and its tributaries.

- By 2001, identify and rank non-native, invasive aquatic and terrestrial species which are causing or have the potential to cause significant negative impacts to the Bay's aquatic ecosystem. By 2003, develop and implement management plans for those species deemed problematic to the restoration and integrity of the Bay's ecosystem.

Fish Passage and Migratory and Resident Fish

- By June 2002, identify the final initiatives necessary to achieve our existing goal of restoring fish passage for migratory fish to more than 1,357 miles of currently blocked river habitat by 2003 and establish a monitoring program to assess outcomes.
- By 2002, set a new goal with implementation schedules for additional migratory and resident fish passages that addresses the removal of physical blockages. In addition, the goal will address the removal of chemical blockages caused by acid mine drainage. Projects should be selected for maximum habitat and stock benefit.
- By 2002, assess trends in populations for priority migratory fish species. Determine tributary-specific target population sizes based upon projected fish passage, and current and projected habitat available, and provide recommendations to achieve those targets.
- By 2003, revise fish management plans to include strategies to achieve target population sizes of tributary-specific migratory fish.

Multi-species Management

- By 2004, assess the effects of different population levels of filter feeders such as menhaden, oysters and clams on Bay water quality and habitat.
- By 2005, develop ecosystem-based multi-species management plans for targeted species.
- By 2007, revise and implement existing fisheries management plans to incorporate ecological, social and economic considerations, multi-species fisheries management and ecosystem approaches.

Crabs

- By 2001, establish harvest targets for the blue crab fishery and begin implementing complementary state fisheries management strategies Baywide. Manage the blue crab fishery to restore a healthy spawning biomass, size and age structure.

VITAL HABITAT PROTECTION AND RESTORATION

The Chesapeake Bay's natural infrastructure is an intricate system of terrestrial and aquatic habitats, linked to the landscapes and the environmental quality of the watershed. It is composed of the thousands of miles of river and stream habitat that interconnect the land, water, living resources and human communities of the Bay watershed. These vital habitats–including open water, underwater grasses, marshes, wetlands, streams and forests–support living resource abundance by providing key food and habitat for a variety of species. Submerged aquatic vegetation reduces shoreline erosion while forests and wetlands protect water quality by naturally processing the pollutants before they enter the water. Long-term protection of this natural infrastructure is essential.

In managing the Bay ecosystem as a whole, we recognize the need to focus on the individuality of each river, stream and creek, and to secure their protection in concert with the communities and individuals that reside within these small watersheds. We also recognize that we must continue to refine and share information regarding the importance of these vital habitats to the Bay's fish, shellfish and waterfowl. Our efforts to preserve the integrity of this natural infrastructure will protect the Bay's waters and living resources and will ensure the viability of human economies and communities that are dependent upon those resources for sustenance, reverence and posterity.

GOAL

Preserve, protect and restore those habitats and natural areas that are vital to the survival and diversity of the living resources of the Bay and its rivers.

Submerged Aquatic Vegetation

- Recommit to the existing goal of protecting and restoring 114,000 acres of submerged aquatic vegetation (SAV).
- By 2002, revise SAV restoration goals and strategies to reflect historic abundance, measured as acreage and density from the 1930s to the present. The revised goals will include specific levels of water clarity which are to be met in 2010. Strategies to achieve these goals will address water clarity, water quality and bottom disturbance.
- By 2002, implement a strategy to accelerate protection and restoration of SAV beds in areas of critical importance to the Bay's living resources.

Watersheds

- By 2010, work with local governments, community groups and watershed organizations to develop and implement locally supported watershed management plans in two-thirds of the Bay watershed covered by this Agreement. These plans would address the protection, conservation and restoration of stream corridors, riparian forest buffers and wetlands for the purposes of improving habitat and water quality, with collateral benefits for optimizing stream flow and water supply.
- By 2001, each jurisdiction will develop guidelines to ensure the aquatic health of stream corridors. Guidelines should consider optimal surface and groundwater flows.
- By 2002, each jurisdiction will work with local governments and communities that have watershed management plans to select pilot projects that promote stream corridor protection and restoration.
- By 2003, include in the "State of the Bay Report," and make available to the public, local governments and others, information concerning the aquatic health of stream corridors based on adopted regional guidelines.
- By 2004, each jurisdiction, working with local governments, community groups and watershed organizations, will develop stream corridor restoration goals based on local watershed management planning.

Wetlands

- Achieve a no-net loss of existing wetlands acreage and function in the signatories' regulatory programs.
- By 2010, achieve a net resource gain by restoring 25,000 acres of tidal and non-tidal wetlands. To do this, we commit to achieve and maintain an average restoration rate of 2,500 acres per year basin wide by 2005 and beyond. We will evaluate our success in 2005.
- Provide information and assistance to local governments and community groups for the development and implementation of wetlands preservation plans as a component of a locally based integrated watershed management plan. Establish a goal of implementing the wetlands plan component in 25 percent of the land area of each state's Bay watershed by 2010. The plans would preserve key wetlands while addressing surrounding land use so as to preserve wetland functions.
- Evaluate the potential impact of climate change on the Chesapeake Bay watershed, particularly with respect to its wetlands, and consider potential management options.

Forests

- By 2002, ensure that measures are in place to meet our riparian forest buffer restoration goal of 2,010 miles by 2010. By 2003, establish a new goal to expand buffer mileage.
- Conserve existing forests along all streams and shorelines.
- Promote the expansion and connection of contiguous forests through conservation easements, greenways, purchase and other land conservation mechanisms.

WATER QUALITY PROTECTION AND RESTORATION

Improving water quality is the most critical element in the overall protection and restoration of the Chesapeake Bay and its tributaries. In 1987, we committed to achieving a 40 percent reduction in controllable nutrient loads to the Bay. In 1992, we committed to tributary-specific reduction strategies to achieve this reduction and agreed to stay at or below these nutrient loads once attained. We have made measurable reductions in pollution loading despite continuing growth and development. Still, we must do more.

Recent actions taken under the Clean Water Act resulted in listing portions of the Chesapeake Bay and its tidal rivers as "impaired waters." These actions have emphasized the regulatory framework of the Act along with the ongoing cooperative efforts of the Chesapeake Bay Program as the means to address the nutrient enrichment problems within the Bay and its rivers. In response, we have developed, and are implementing, a process for integrating the cooperative and statutory programs of the Chesapeake Bay and its tributaries. We have agreed to the goal of improving water quality in the Bay and its tributaries so that these waters may be removed from the impaired waters list prior to the time when regulatory mechanisms under Section 303(d) of the Clean Water Act would be applied.

We commit to achieve and maintain water quality conditions necessary to support living resources throughout the Chesapeake Bay ecosystem. Where we have failed to achieve established water quality goals, we will take actions necessary to reach and maintain those goals. We will make pollution prevention a central theme in the protection of water quality. And we will take actions that protect freshwater flow regimes for riverine and estuarine habitats. In pursuing the restoration of vital habitats throughout

the watershed, we will continue efforts to improve water clarity in order to meet light requirements necessary to support SAV. We will expand our efforts to reduce sediments and airborne pollution, and ensure that the Bay is free from toxic effects on living resources and human health. We will continue our cooperative intergovernmental approach to achieve and maintain water quality goals through cost-effective and equitable means within the framework of federal and state law. We will evaluate the potential impacts of emerging issues, including, among others, airborne ammonia and nonpoint sources of chemical contaminants. Finally, we will continue to monitor water quality conditions and adjust our strategies accordingly.

GOAL

Achieve and maintain the water quality necessary to support the aquatic living resources of the Bay and its tributaries and to protect human health.

Nutrients and Sediments

- Continue efforts to achieve and maintain the 40 percent nutrient reduction goal agreed to in 1987, as well as the goals being adopted for the tributaries south of the Potomac River.
- By 2010, correct the nutrient- and sediment-related problems in the Chesapeake Bay and its tidal tributaries sufficiently to remove the Bay and the tidal portions of its tributaries from the list of impaired waters under the Clean Water Act. In order to achieve this:

    1. By 2001, define the water quality conditions necessary to protect aquatic living resources and then assign load reductions for nitrogen and phosphorus to each major tributary;

    2. Using a process parallel to that established for nutrients, determine the sediment load reductions necessary to achieve the water quality conditions that protect aquatic living resources, and assign load reductions for sediment to each major tributary by 2001;

    3. By 2002, complete a public process to develop and begin implementation of revised Tributary Strategies to achieve and maintain the assigned loading goals;

    4. By 2003, the jurisdictions with tidal waters will use their best efforts to adopt new or revised water quality standards consistent with the defined water quality conditions. Once adopted by the jurisdictions, the Environmental Protection Agency will work expeditiously to review the new or revised standards, which will then be used as the basis for removing the Bay and its tidal rivers from the list of impaired waters; and

    5. By 2003, work with the Susquehanna River Basin Commission and others to adopt and begin implementing strategies that prevent the loss of the sediment retention capabilities of the lower Susquehanna River dams.

Chemical Contaminants

- We commit to fulfilling the 1994 goal of a Chesapeake Bay free of toxics by reducing or eliminating the input of chemical contaminants from all controllable sources to levels that result in no toxic or bioaccumulative impact on the living resources that inhabit the Bay or on human health.
- By Fall of 2000, reevaluate and revise, as necessary, the "Chesapeake Bay Basinwide Toxics Reduction and Prevention Strategy" focusing on:

    1. Complementing state and federal regulatory programs to go beyond traditional point source controls, including nonpoint sources such as groundwater discharge and atmospheric deposition, by using a watershed-based approach; and

    2. Understanding the effects and impacts of chemical contaminants to increase the effectiveness of management actions.

- Through continual improvement of pollution prevention measures and other voluntary means, strive for zero release of chemical contaminants from point sources, including air sources. Particular emphasis shall be placed on achieving, by 2010, elimination of mixing zones for persistent or bioaccumulative toxics.
- Reduce the potential risk of pesticides to the Bay by targeting education, outreach and implementation of Integrated Pest Management and specific Best Management Practices on those lands that have higher potential for contributing pesticide loads to the Bay.

Priority Urban Waters

- Support the restoration of the Anacostia River, Baltimore Harbor, and Elizabeth River and their watersheds as models for urban river restoration in the Bay basin.
- By 2010, the District of Columbia, working with its watershed partners, will reduce pollution loads to the Anacostia River in order to eliminate public health concerns and achieve the living resource, water quality and habitat goals of this and past Agreements.

Air Pollution

- By 2003, assess the effects of airborne nitrogen compounds and chemical contaminants on the Bay ecosystem and help establish reduction goals for these contaminants.

Boat Discharge

- By 2003, establish appropriate areas within the Chesapeake Bay and its tributaries as "no discharge zones" for human waste from boats. By 2010, expand by 50 percent the number and availability of waste pump-out facilities.
- By 2006, reassess our progress in reducing the impact of boat waste on the Bay and its tributaries. This assessment will include evaluating the benefits of further expanding no discharge zones, as well as increasing the number of pump-out facilities.

SOUND LAND USE

In 1987, the signatories agreed that "there is a clear correlation between population growth and associated development and environmental degradation in the Chesapeake Bay system." This Agreement reaffirms that concept and recognizes that more must be done.

An additional three million people are expected to settle in the watershed by 2020. This growth could potentially eclipse the nutrient reduction and habitat protection gains of the past. Therefore it is critical that we consider our approaches to land use in order to ensure progress in protecting the Bay and its local watersheds.

Enhancing, or even maintaining, the quality of the Bay while accommodating growth will frequently involve difficult choices. It will require a renewed commitment to appropriate development standards. The signatories will assert the full measure of their authority to limit and mitigate the potential adverse effects of continued growth; each however, will pursue this objective within the framework of its own historic, existing or future land use practices or processes. Local jurisdictions have been delegated authority over many decisions regarding growth and development which have both direct and indirect effects on the Chesapeake Bay system and its living resources. The role of local governments in the Bay's restoration and protection effort will be given proper recognition and support through state and federal resources. States will also engage in active partnerships with local governments in managing growth and development in ways that support the following goal.

We acknowledge that future development will be sustainable only if we protect our natural and rural resource land, limit impervious surfaces and concentrate new growth in existing population centers or suitable areas served by appropriate infrastructure. We will work to integrate environmental, community and economic goals by promoting more environmentally sensitive forms of development. We will also strive to coordinate land-use, transportation, water and sewer and other infrastructure planning so that funding and policies at all levels of government do not contribute to poorly planned growth and development or degrade local water quality and habitat. We will advance these policies by creating partnerships with local governments to protect our communities and to discharge our duties as trustees in the stewardship of the Chesapeake Bay. Finally, we will report every two years on our progress in achieving our commitments to promote sound land use.

GOAL

Develop, promote and achieve sound land use practices
which protect and restore watershed resources and water quality,
maintain reduced pollutant loadings for the Bay and its tributaries,
and restore and preserve aquatic living resources.

Land Conservation

- By 2001, complete an assessment of the Bay's resource lands including forests and farms, emphasizing their role in the protection of water quality and critical habitats, as well as cultural and economic viability.
- Provide financial assistance or new revenue sources to expand the use of voluntary and market-based mechanisms such as easements, purchase or transfer of development rights and other approaches to protect and preserve natural resource lands.
- Strengthen programs for land acquisition and preservation within each state that are supported by funding and target the most valued lands for protection. Permanently preserve from development 20 percent of the land area in the watershed by 2010.

- Provide technical and financial assistance to local governments to plan for or revise plans, ordinances and subdivision regulations to provide for the conservation and sustainable use of the forest and agricultural lands.
- In cooperation with local governments, develop and maintain in each jurisdiction a strong GIS system to track the preservation of resource lands and support the implementation of sound land use practices.

Development, Redevelopment and Revitalization

- By 2012, reduce the rate of harmful sprawl development of forest and agricultural land in the Chesapeake Bay watershed by 30 percent measured as an average over five years from the baseline of 1992-1997, with measures and progress reported regularly to the Chesapeake Executive Council.
- By 2005, in cooperation with local government, identify and remove state and local impediments to low impact development designs to encourage the use of such approaches and minimize water quality impacts.
- Work with communities and local governments to encourage sound land use planning and practices that address the impacts of growth, development and transportation on the watershed.
- By 2002, review tax policies to identify elements which discourage sustainable development practices or encourage undesirable growth patterns. Promote the modification of such policies and the creation of tax incentives which promote the conservation of resource lands and encourage investments consistent with sound growth management principles.
- The jurisdictions will promote redevelopment and remove barriers to investment in underutilized urban, suburban and rural communities by working with localities and development interests.
- By 2002, develop analytical tools that will allow local governments and communities to conduct watershed-based assessment of the impacts of growth, development and transportation decisions.
- By 2002, compile information and guidelines to assist local governments and communities to promote ecologically-based designs in order to limit impervious cover in undeveloped and moderately developed watersheds and reduce the impact of impervious cover in highly developed watersheds.
- Provide information to the development community and others so they may champion the application of sound land use practices.
- By 2003, work with local governments and communities to develop land-use management and water resource protection approaches that encourage the concentration of new residential development in areas supported by adequate water resources and infrastructure to minimize impacts on water quality.
- By 2004, the jurisdictions will evaluate local implementation of stormwater, erosion control and other locally-implemented water quality protection programs that affect the Bay system and ensure that these programs are being coordinated and applied effectively in order to minimize the impacts of development.
- Working with local governments and others, develop and promote wastewater treatment options, such as nutrient reducing septic systems, which protect public health and minimize impacts to the Bay's resources.
- Strengthen brownfield redevelopment. By 2010, rehabilitate and restore 1,050 brownfield sites to productive use.
- Working with local governments, encourage the development and implementation of emerging urban storm water retrofit practices to improve their water quantity and quality function.

Transportation

- By 2002, the signatory jurisdictions will promote coordination of transportation and land use planning to encourage compact, mixed use development patterns, revitalization in existing communities and transportation strategies that minimize adverse effects on the Bay and its tributaries.
- By 2002, each state will coordinate its transportation policies and programs to reduce the dependence on automobiles by incorporating travel alternatives such as telework, pedestrian, bicycle and transit options, as appropriate, in the design of projects so as to increase the availability of alternative modes of travel as measured by increased use of those alternatives.
- Consider the provisions of the federal transportation statutes for opportunities to purchase easements to preserve resource lands adjacent to rights of way and special efforts for stormwater management on both new and rehabilitation projects.
- Establish policies and incentives which encourage the use of clean vehicle and other transportation technologies that reduce emissions.

Public Access

- By 2010, expand by 30 percent the system of public access points to the Bay, its tributaries and related resource sites in an environmentally sensitive manner by working with state and federal agencies, local governments and stakeholder organizations.
- By 2005, increase the number of designated water trails in the Chesapeake Bay region by 500 miles.
- Enhance interpretation materials that promote stewardship at natural, recreational, historical and cultural public access points within the Chesapeake Bay watershed.
- By 2003, develop partnerships with at least 30 sites to enhance place-based interpretation of Bay-related resources and themes and stimulate volunteer involvement in resource restoration and conservation.

STEWARDSHIP AND COMMUNITY ENGAGEMENT

The Chesapeake Bay is dependent upon the actions of every citizen in the watershed, both today and in the future. We recognize that the cumulative benefit derived from community-based watershed programs is essential for continued progress toward a healthier Chesapeake Bay. Therefore, we commit ourselves to engage our citizens by promoting a broad conservation ethic throughout the fabric of community life, and foster within all citizens a deeper understanding of their roles as trustees of their own local environments. Through their actions, each individual can contribute to the health and well-being of their neighborhood streams, rivers and the land that surrounds them, not only as ecological stewards of the Bay but also as members of watershed-wide communities. By focusing individuals on local resources, we will advance Baywide restoration as well.

We recognize that the future of the Bay also depends on the actions of generations to follow. Therefore, we commit to provide opportunities for cooperative learning and action so that communities can promote local environmental quality for the benefit and enjoyment of residents and visitors. We will assist communities throughout the watershed in improving quality of life, thereby strengthening local

economies and connecting individuals to the Bay through their shared sense of responsibility. We will seek to increase the financial and human resources available to localities to meet the challenges of restoring the Chesapeake Bay.

GOAL

Promote individual stewardship and assist individuals, community-based organizations, businesses, local governments and schools to undertake initiatives to achieve the goals and commitments of this agreement.

Education and Outreach

- Make education and outreach a priority in order to achieve public awareness and personal involvement on behalf of the Bay and local watersheds.
- Provide information to enhance the ability of citizen and community groups to participate in Bay restoration activities on their property and in their local watershed.
- Expand the use of new communications technologies to provide a comprehensive and interactive source of information on the Chesapeake Bay and its watershed for use by public and technical audiences. By 2001, develop and maintain a web-based clearing house of this information specifically for use by educators.
- Beginning with the class of 2005, provide a meaningful Bay or stream outdoor experience for every school student in the watershed before graduation from high school.
- Continue to forge partnerships with the Departments of Education and institutions of higher learning in each jurisdiction to integrate information about the Chesapeake Bay and its watershed into school curricula and university programs.
- Provide students and teachers alike with opportunities to directly participate in local restoration and protection projects, and to support stewardship efforts in schools and on school property.
- By 2002, expand citizen outreach efforts to more specifically include minority populations by, for example, highlighting cultural and historical ties to the Bay, and providing multi-cultural and multilingual educational materials on stewardship activities and Bay information.

Community Engagement

- Jurisdictions will work with local governments to identify small watersheds where community-based actions are essential to meeting Bay restoration goals—in particular wetlands, forested buffers, stream corridors and public access and work with local governments and community organizations to bring an appropriate range of Bay program resources to these communities.
- Enhance funding for locally-based programs that pursue restoration and protection projects that will assist in the achievement of the goals of this and past agreements.
- By 2001, develop and maintain a clearing house for information on local watershed restoration efforts, including financial and technical assistance.
- By 2002, each signatory jurisdiction will offer easily-accessible information suitable for analyzing environmental conditions at a small watershed scale.

- Strengthen the Chesapeake Bay Program's ability to incorporate local governments into the policy decision making process. By 2001, complete a reevaluation of the Local Government Participation Action Plan and make necessary changes in Bay program and jurisdictional functions based upon the reevaluation.
- Improve methods of communication with and among local governments on Bay issues and provide adequate opportunities for discussion of key issues.
- By 2001, identify community watershed organizations and partnerships. Assist in establishing new organizations and partnerships where interest exists. These partners will be important to successful watershed management efforts in distributing information to the public, and engaging the public in the Bay restoration and preservation effort.
- By 2005, identify specific actions to address the challenges of communities where historically poor water quality and environmental conditions have contributed to disproportional health, economic or social impacts.

Government by Example

- By 2002, each signatory will put in place processes to:
    1. Ensure that all properties owned, managed or leased by the signatories are developed, redeveloped and used in a manner consistent with all relevant goals, commitments and guidance of this Agreement.
    2. Ensure that the design and construction of signatory-funded development and redevelopment projects are consistent with all relevant goals, commitments and guidance of this Agreement.
- Expand the use of clean vehicle technologies and fuels on the basis of emission reductions, so that a significantly greater percentage of each signatory government's fleet of vehicles use some form of clean technology.
- By 2001, develop an Executive Council Directive to address stormwater management to control nutrient, sediment and chemical contaminant runoff from state, federal and District owned land.

Partnerships

- Strengthen partnerships with Delaware, New York and West Virginia by promoting communication and by seeking agreements on issues of mutual concern.
- Work with non-signatory Bay states to establish links with community-based organizations throughout the Bay watershed.

BY THIS AGREEMENT, we rededicate ourselves to the restoration and protection of the ecological integrity, productivity and beneficial uses of the Chesapeake Bay system. We reaffirm our commitment to previously-adopted Chesapeake Bay Agreements and their supporting policies. We agree to report annually to the citizens on the state of the Bay and consider any additional actions necessary.

DATE June 28, 2000

FOR THE COMMONWEALTH OF VIRGINIA

FOR THE STATE OF MARYLAND

FOR THE COMMONWEALTH OF PENNSYLVANIA

FOR THE DISTRICT OF COLUMBIA

FOR THE UNITED STATES OF AMERICA

FOR THE CHESAPEAKE BAY COMMISSION

Environmental Endpoints

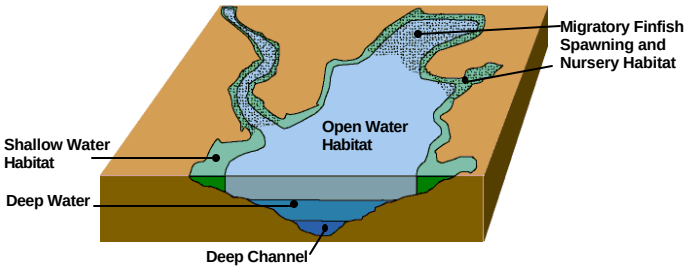
Updating Water Quality Standards for the Chesapeake Bay

Environmental endpoints have been developed for the Chesapeake Bay by a team of Chesapeake Bay watershed scientists and managers. These environmental endpoints consist of numeric water quality criteria and designated uses for the Chesapeake Bay. In a regulatory framework, water quality criteria and designated uses are what constitute Virginia's Water Quality Standards. The purpose of revising standards is to protect and restore water quality required by living resources of Chesapeake Bay and also to reflect naturally occurring conditions. The Chesapeake Bay environmental endpoints, or standards, address the variety of habitats and ecological diversity found within Chesapeake Bay.

Habitat Zones & Criteria

Under the revised environmental endpoints, the Chesapeake Bay and its tidal tributaries will be divided into five areas (designated use zones) where different water quality criteria will apply depending on the aquatic life found in each zone. Combining these zones with numeric water quality criteria will provide an overall standard for achieving desired aquatic habitat conditions.

Chesapeake Bay Tidal Tributaries
Five Designated Use Zones
(EPA Chesapeake Bay Program)



What will the revised criteria do?

Water clarity will ensure adequate sunlight for important underwater grasses in most shallow areas where the depth is two meters or less.

Dissolved oxygen will ensure enough oxygen is available at the right place at the right time of the year to support everything from sensitive fish larvae and adults to oysters.

Chlorophyll *a* criteria will aim to reduce blooms of harmful, noxious algae while promoting the growth of phytoplankton that provide good 'fish food.'

Bay Journal, July-August 2001

Habitat zones will be required to meet different criteria based on the species inhabiting the zones. These criteria are intended to protect the most sensitive life stages, for example, fish eggs and larvae found in the spawning and nursery habitat zone. The criteria look at water clarity, dissolved oxygen and chlorophyll *a*. No single criterion value will apply on a Bay-wide basis, but instead, will vary from place to place, and in some cases, season to season.

Setting Water Quality Goals

New water quality criteria, or goals, will be set for water clarity, dissolved oxygen, and chlorophyll *a* content. (The current program has one criterion: dissolved oxygen.) These goals will be adopted as water quality standards through a rulemaking process that includes public meetings and hearings to receive comment on the proposal. Final action will be taken by the State Water Control Board after consideration of public comments.

Watershed-Based Initiatives

Pollution "caps" or limits for nutrient and sediment loads will be specifically crafted for each tributary of the Bay watershed. These pollution caps will reflect local environmental conditions to achieve the new water quality standards.

Based on the Chesapeake Bay Program computer model estimates, more pollutant reductions will need to be accomplished in the next eight years than what was achieved in the past fourteen—a challenge everyone will share. To meet the upcoming pollutant load reductions, tributary strategies will be revised for each watershed to describe in detail how these ambitious clean-up plans will be implemented. (For more information on Virginia tributary strategies, visit **www.deq.state.va.us/bay/strategies.html).**

Getting Involved and Informed

In the meantime, we can all work towards reducing harmful pollutants. For example, if you have a septic system, properly maintain it and reduce the risk of harmful bacteria and nutrients from entering streams and groundwater. If you fertilize your lawn, know how much you will need by performing a soil test (tests can be purchased at home improvement stores or contact your local Cooperative Extension office) and reading the label on the fertilizer container. Use native plants when landscaping (they require less maintenance and water). When walking your pet, don't forget to clean up afterwards—animal waste can contain harmful bacteria and nutrients that can be carried away by stormwater, ending up in our local waterways.

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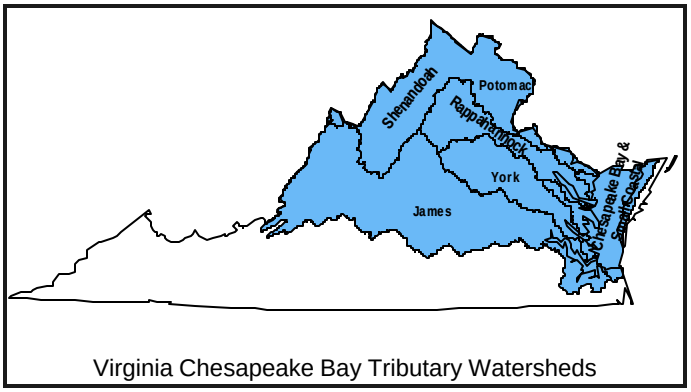

Virginia Chesapeake Bay Tributary Watersheds

For more information about reducing nonpoint source pollution in your community, visit **www.dcr.state.va.us/sw/nps.htm** or contact your local DCR Chesapeake Bay watershed field office:

Albemarle, Chowan & Coastal Watershed Office
(757) 925-2468

James Watershed Office
Michael Bowman, Watershed Manager
(804) 527-4484
mbowman@dcr.state.va.us

Potomac Watershed Office
Mary Apostolico, Watershed Manager
(540) 347-6420
mapostolico@dcr.state.va.us

Rappahannock Watershed Office
Matt Criblez, Watershed Manager
(540) 899-4463
mdcriblez@dcr.state.va.us

Shenandoah Watershed Office
Tamara Keeler, Watershed Manager
(540) 332-9991

York Watershed Office
(804) 443-6752

To learn more about Virginia's Water Quality Standards program and public participation opportunities, visit **www.deq.state.va.us/wqs**.

To learn more about protecting and restoring water quality of the Chesapeake Bay, visit **www.chesapeakebay.net/restoringwater.htm.**

08/02

Table C-1:
Shenandoah/Potomac River Basin - 2001 Point Source Phosphorus Discharge Inventory

RANK	LOCATION	FACILITY	2001 TP LOAD DISCH. (lbs/yr)	1985 TP LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Rockingham	Broadway STP	0	4,810	-100%
2	Rockingham	Pilgrims Pride-Timberville	0	280	-100%
3	Rockingham	Rocco Quality Foods	0	14,610	-100%
4	Rockingham	Timberville STP	0	1,750	-100%
5	Waynesboro	DuPont-Waynesboro	1,100	57,200	-98%
6	Frederick	FWSA-Opequon STP[1]	2,240	77,540	-97%
7	Arlington	Arlington STP	7,540	46,890	-84%
8	Warren	Front Royal STP	7,870	38,380	-79%
9	Rockingham	HRRSA-North River STP	33,310	125,660	-73%
10	King George	King George-Dahlgren STP[2]	530	1,950	-73%
11	Staunton	Staunton-Middle River STP[3]	16,210	55,720	-71%
12	Prince William	Quantico-Mainside STP	300	880	-66%
13	Augusta	Weyers Cave STP	1,130	3,020	-63%
14	Shenandoah	Woodstock STP	3,730	9,160	-59%
15	Fairfax	Noman Cole STP[4]	12,490	30,090	-58%
16	Augusta	ACSA-Stuarts Draft STP	4,170	9,740	-57%
17	Alexandria	Alexandria STP	7,210	16,260	-56%
18	Shenandoah	Strasburg STP	6,430	14,420	-55%
19	Waynesboro	Waynesboro STP	22,580	48,320	-53%
20	Shenandoah	Stoney Creek San. Dist. STP	2,420	5,030	-52%
21	Loudoun	Leesburg	12,290	25,320	-51%
22	Loudoun	Purcellville	2,570	5,260	-51%
23	Stafford	Aquia STP	1,150	2,050	-44%
24	Augusta	ACSA-Fishersville STP	10,230	15,200	-33%
25	Shenandoah	New Market STP	3,770	5,180	-27%
26	Loudoun	Round Hill STP	880	1,170	-25%
27	Westmoreland	Colonial Beach STP	5,960	7,790	-23%
28	Prince William	PWCSA-Mooney STP	2,870	3,690	-22%
29	Prince William	Dale Serv. Corp. #1	860	1,100	-22%
30	Prince William	Dale Serv. Corp. #8	830	840	-1%
31	DC	Blue Plains - VA Portion	8,500	6,850	24%
32	Rockingham	Merck-Elkton	104,920	60,580	73%
33	Rockingham	Pilgrims Pride-Hinton	53,260	26,320	102%
34	Page	Luray STP	7,090	2,930	142%
35	Rockingham	SIL Clean Water STP[5]	53,400	NA	149%
36	Fairfax	Upper Occoquan S.A.	5,190	860	503%
37	Shenandoah	Rocco Farm Foods	133,590	19,090	600%
38	Rockingham	Massanutten PSA STP[6]	3,470	NA	NA
39	Frederick	Parkins Mill STP[6]	9,580	NA	NA
40	King George	USNSWC-Dahlgren STP[6]	3,010	NA	NA
		Basin Total =	**552,680**	**762,680**[7]	**-28%**

NOTES:

[1] Accounts for Winchester and Abrams Creek plants in 1985 comparison.
[2] Accounts for Dahlgren and Bayberry plants in 1985 comparison.
[3] Accounts for Verona and Middle River plants in 1985 comparison.
[4] Accounts for Lower Potomac, Little Hunting Creek, and Lorton plants in 1985 comparison.
[5] Accounts for Broadway, Timberville, Rocco Qual. Foods, and Pilgrims Pride in 1985 comparison.
[6] These facilities are either new or loads from 1985 are not available for comparison.
[7] The 1985 Basin Total includes loads from treatment plants that have since gone off-line.

Table C-2:
Shenandoah/Potomac River Basin - 2001 Point Source Nitrogen Discharge Inventory

RANK	LOCATION	FACILITY	2001 TN LOAD DISCH. (lbs/yr)	1985 TN LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Rockingham	Broadway STP	0	14,230	-100%
2	Rockingham	Pilgrims Pride-Timberville	0	40,580	-100%
3	Rockingham	Rocco Quality Foods	0	12,490	-100%
4	Rockingham	Timberville STP	0	5,120	-100%
5	Waynesboro	DuPont-Waynesboro	21,470	299,630	-93%
6	Frederick	FWSA-Opequon STP[1]	63,930	226,560	-72%
7	Rockingham	Merck-Elkton	83,720	233,880	-64%
8	Prince William	Quantico-Mainside STP	34,530	82,540	-58%
9	Rockingham	HRRSA-North River STP	206,540	367,160	-44%
10	Prince William	PWCSA-Mooney STP	366,430	609,160	-40%
11	Stafford	Aquia STP	44,060	64,890	-32%
12	King George	King George-Dahlgren STP[2]	3,920	5,690	-31%
13	Waynesboro	Waynesboro STP	136,740	190,930	-28%
14	Warren	Front Royal STP	86,160	112,140	-23%
15	Augusta	Weyers Cave STP	22,650	28,720	-21%
16	DC	Blue Plains - VA Portion	735,990	814,170	-10%
17	Augusta	ACSA-Stuarts Draft STP	26,670	28,460	-6%
18	Staunton	Staunton-Middle River STP[3]	157,530	162,810	-3%
19	Rockingham	SIL Clean Water STP[4]	70,330	NA	-3%
20	Arlington	Arlington STP	1,639,670	1,641,280	0%
21	Shenandoah	Woodstock STP	27,920	26,760	4%
22	Loudoun	Leesburg	74,870	71,730	4%
23	Westmoreland	Colonial Beach STP	24,580	22,770	8%
24	Rockingham	Pilgrims Pride-Hinton	48,730	42,970	13%
25	Shenandoah	Strasburg STP	48,110	42,120	14%
26	Fairfax	Noman Cole STP[5]	2,598,890	2,225,840	17%
27	Prince William	Dale Serv. Corp. #1	109,990	91,320	20%
28	Shenandoah	Stoney Creek San. Dist. STP	18,080	14,690	23%
29	Loudoun	Purcellville	19,180	15,370	25%
30	Augusta	ACSA-Fishersville STP	61,080	44,400	38%
31	Alexandria	Alexandria STP	2,841,900	1,994,010	43%
32	Shenandoah	New Market STP	28,210	15,140	86%
33	Loudoun	Round Hill STP	6,540	3,420	91%
34	Prince William	Dale Serv. Corp. #8	95,530	38,360	149%
35	Fairfax	Upper Occoquan S.A.	1,509,510	597,530	153%
36	Shenandoah	Rocco Farm Foods	427,780	147,310	190%
37	Page	Luray STP	10,190	3,380	201%
38	Rockingham	Massanutten PSA STP[6]	14,700	NA	NA
39	Frederick	Parkins Mill STP[6]	71,660	NA	NA
40	King George	USNSWC-Dahlgren STP[6]	1,510	NA	NA
		Basin Total =	**11,739,300**	**10,868,740**[7]	**+8%**

NOTES:

[1] Accounts for Winchester and Abrams Creek plants in 1985 comparison.
[2] Accounts for Dahlgren and Bayberry plants in 1985 comparison.
[3] Accounts for Verona and Middle River plants in 1985 comparison.
[4] Accounts for Broadway, Timberville, Rocco Qual. Foods, and Pilgrims Pride in 1985 comparison.
[5] Accounts for Lower Potomac, Little Hunting Creek, and Lorton plants in 1985 comparison.
[6] These facilities are either new or loads from 1985 are not available for comparison.
[7] The 1985 Basin Total includes loads from treatment plants that have since gone off-line.

Table C-3:
Rappahannock River Basin - 2001 Point Source Phosphorus Discharge Inventory

RANK	LOCATION	FACILITY	2001 TP LOAD DISCH. (lbs/yr)	1985 TP LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Fredericksburg	Fredericksburg STP	6,370	50,070	-87%
2	Culpeper	Culpeper STP	4,190	32,450	-87%
3	Fauquier	Warrenton STP	2,940	20,460	-86%
4	Spotsylvania	Massaponax STP	7,040	29,580	-76%
5	Essex	Tappahannock STP	1,410	4,290	-67%
6	Orange	Orange STP	4,370	11,880	-63%
7	Stafford	Little Falls Run STP[1]	8,840	17,140	-48%
8	Middlesex	Urbanna STP	660	970	-32%
9	Richmond	Warsaw STP	1,420	1,560	-9%
10	Fauquier	Remington STP	3,510	3,510	0%
11	Caroline	Ft. A.P. Hill - Wilcox STP	2,540	1,010	151%
12	Spotsylvania	FMC STP[2]	1,080	NA	NA
13	Westmoreland	Montross STP[2]	100	NA	NA
14	Orange	Wilderness STP[2]	3,600	NA	NA
		Basin Total =	**48,070**	**185,200**[3]	**-74%**

Table C-4:
Rappahannock River Basin - 2001 Point Source Nitrogen Discharge Inventory

RANK	LOCATION	FACILITY	2001 TN LOAD DISCH. (lbs/yr)	1985 TN LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Fredericksburg	Fredericksburg STP	42,800	146,300	-71%
2	Fauquier	Remington STP	7,220	10,250	-30%
3	Fauquier	Warrenton STP	46,370	59,770	-22%
4	Orange	Orange STP	32,710	34,720	-6%
5	Middlesex	Urbanna STP	2,860	2,850	0%
6	Culpeper	Culpeper STP	53,310	52,560	1%
7	Stafford	Little Falls Run STP[1]	63,440	50,090	27%
8	Essex	Tappahannock STP	17,370	12,520	39%
9	Spotsylvania	Massaponax STP	186,090	88,230	111%
10	Richmond	Warsaw STP	10,640	4,550	134%
11	Caroline	Ft. A.P. Hill - Wilcox STP	15,710	2,960	431%
12	Spotsylvania	FMC STP[2]	37,690	NA	NA
13	Westmoreland	Montross STP[2]	580	NA	NA
14	Orange	Wilderness STP[2]	26,900	NA	NA
		Basin Total =	**543,690**	**490,540**[3]	**+11%**

NOTES:
[1] Little Falls Run replaced Claiborne Run STP; load comparison between these plants.
[2] FMC was not in service in 1985, and Wilderness & Montross are new facilties, so there are no 1985 loads to compare against.
[3] The 1985 Basin Total includes loads from treatment plants that have since gone off-line.

Table C-5:
York River Basin - 2001 Point Source Phosphorus Discharge Inventory

RANK	LOCATION	FACILITY	2001 TP LOAD DISCH. (lbs/yr)	1985 TP LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	King William	St. Laurent Paper	55,580	241,530	-77%
2	York	HRSD-York STP	35,490	152,130	-77%
3	Orange	Gordonsville STP	3,170	10,720	-70%
4	King William	West Point STP	3,660	9,740	-62%
5	Hanover	Ashland STP	7,140	12,300	-42%
6	Hanover	Doswell STP	41,650	19,730	111%
7	York	BP/Amoco-Yorktown[1]	33,410	2,220	NA
8	Caroline	Caroline Co. STP[2]	2,260	NA	NA
9	New Kent	Parham Landing STP[2]	240	NA	NA
		Basin Total =	**182,600**	**448,370**	**-59%**

Table C-6:
York River Basin - 2001 Point Source Nitrogen Discharge Inventory

RANK	LOCATION	FACILITY	2001 TN LOAD DISCH. (lbs/yr)	1985 TN LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	King William	St. Laurent Paper	269,180	586,340	-54%
2	Hanover	Ashland STP	21,570	35,050	-38%
3	Orange	Gordonsville STP	23,670	31,310	-24%
4	King William	West Point STP	27,440	28,460	-4%
5	York	HRSD-York STP	534,300	481,920	11%
6	Hanover	Doswell STP	84,850	65,550	29%
7	York	BP/Amoco-Yorktown[1]	126,770	157,760	NA
8	Caroline	Caroline Co. STP[2]	13,510	NA	NA
9	New Kent	Parham Landing STP[2]	2,170	NA	NA
		Basin Total =	**1,103,460**	**1,386,390**	**-20%**

NOTES:
[1] Due to changes in sampling location requirements in the BP/Amoco-Yorktown reissued discharge permit, it is inappropriate to compare 2000 loads with 1985.
[2] Caroline Co. & Parham Landing are new facilities; no 1985 loads to compare against.

Table C-7:
James River Basin - 2001 Point Source Phosphorus Discharge Inventory

RANK	LOCATION	FACILITY	2001 TP LOAD DISCH. (lbs/yr)	1985 TP LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Richmond	Richmond STP	77,580	839,070	-91%
2	Nottaway	Crewe STP	320	3,160	-90%
3	Chesterfield	Philip Morris	7,730	60,580	-87%
4	Chesterfield	Falling Creek STP	28,910	209,280	-86%
5	Petersburg	So. Central W.W.A. STP	22,940	144,560	-84%
6	Hopewell	Hopewell STP	30,520	175,440	-83%
7	Alleghany	Covington STP	6,770	37,410	-82%
8	Buena Vista	Buena Vista STP	8,020	36,630	-78%
9	N. News	HRSD-Boat Harbor STP	61,190	260,550	-77%
10	N. News	HRSD-James River STP	64,060	226,630	-72%
11	Rockbridge	Lex-Rockbridge Reg. STP	5,190	16,950	-69%
12	Norfolk	HRSD-Army Base STP	62,360	177,940	-65%
13	Chesterfield	DuPont-Spruance	7,950	22,230	-64%
14	Chesterfield	Brown & Williamson	4,920	13,600	-64%
15	James City	HRSD-Williamsburg STP	43,880	112,440	-61%
16	Chesterfield	Proctors Creek STP	26,010	63,120	-59%
17	Norfolk	HRSD-VIP STP	86,790	200,610	-57%
18	Suffolk	HRSD-Nansemond STP	70,410	133,180	-47%
19	Clifton Forge	Clifton Forge STP	11,790	22,210	-47%
20	Lynchburg	Lynchburg STP	106,670	196,310	-46%
21	Rockbridge	Lees Commercial Carpet	32,170	37,870	-15%
22	Alleghany	Westvaco	25,880	20,110	29%
23	Hopewell	Honeywell Co.-Hopewell	38,290	29,320	31%
24	Pr. Edward	Farmville STP	9,210	6,040	52%
25	Albemarle	RWSA-Moores Creek STP	191,400	90,860	111%
26	Fluvanna	Lake Monticello STP	4,050	1,850	119%
27	Campbell	BWX-Tech NNFD	1,720	410	320%
28	Bedford	Georgia-Pacific	155,230	32,120	383%
29	Hanover	Tyson Foods-Glen Allen	700	140	400%
30	Henrico	Henrico STP[1]	170,580	NA	NA
		Basin Total =	**1,363,240**	**3,576,940**[2]	**-62%**

NOTES:
[1] Henrico STP is a new facility; it's 1985 load is accounted for in the Richmond figure.
[2] The 1985 Basin Total includes loads from treatment plants that have since gone off-line.

Table C-8:
James River Basin - 2001 Point Source Nitrogen Discharge Inventory

RANK	LOCATION	FACILITY	2001 TN LOAD DISCH. (lbs/yr)	1985 TN LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Pr. Edward	Farmville STP	1,970	17,650	-89%
2	Rockbridge	Lex-Rockbridge Reg. STP	10,330	49,520	-79%
3	Hopewell	Hopewell STP	1,284,270	6,101,060	-79%
4	Hopewell	Honeywell Co.-Hopewell	1,091,290	4,460,620	-76%
5	Chesterfield	Falling Creek STP	212,920	767,860	-72%
6	Campbell	BWX-Tech NNFD	238,310	728,250	-67%
7	Hanover	Tyson Foods-Glen Allen	45,890	132,470	-65%
8	Lynchburg	Lynchburg STP	189,100	460,840	-59%
9	Petersburg	So. Central W.W.A. STP	247,930	513,180	-52%
10	Buena Vista	Buena Vista STP	60,000	107,020	-44%
11	Norfolk	HRSD-VIP STP	820,210	1,336,790	-39%
12	Richmond	Richmond STP	1,521,530	2,462,870	-38%
13	James City	HRSD-Williamsburg STP	442,940	632,010	-30%
14	Chesterfield	Brown & Williamson	34,740	49,350	-30%
15	Clifton Forge	Clifton Forge STP	52,490	64,890	-19%
16	Alleghany	Covington STP	93,710	109,300	-14%
17	N. News	HRSD-Boat Harbor STP	933,540	1,077,400	-13%
18	Chesterfield	DuPont-Spruance	174,790	183,890	-5%
19	Nottaway	Crewe STP	9,590	9,220	4%
20	Norfolk	HRSD-Army Base STP	859,830	773,450	11%
21	Alleghany	Westvaco	713,980	554,760	29%
22	Chesterfield	Philip Morris	201,350	152,500	32%
23	Albemarle	RWSA-Moores Creek STP	426,430	308,690	38%
24	N. News	HRSD-James River STP	904,790	631,100	43%
25	Rockbridge	Lees Commercial Carpet	37,810	24,380	55%
26	Chesterfield	Proctors Creek STP	299,550	176,620	70%
27	Suffolk	HRSD-Nansemond STP	1,018,400	509,130	100%
28	Bedford	Georgia-Pacific	272,710	54,960	396%
29	Fluvanna	Lake Monticello STP	30,280	5,410	460%
30	Henrico	Henrico STP[1]	1,273,360	NA	NA
		Basin Total =	**13,504,040**	**23,995,630**[2]	**-44%**

NOTES: [1] Henrico STP is a new facility; it's 1985 load is accounted for in the Richmond figure.
[2] The 1985 Basin Total includes loads from treatment plants that have since gone off-line.

Table C-9:
Eastern & Western Coastal Basins - 2001 Point Source Phosphorus Discharge Inventory

RANK	LOCATION	FACILITY	2001 TN LOAD DISCH. (lbs/yr)	1985 TN LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Accomack	Tangier STP	370	1,170	-68%
2	Virginia Beach	HRSD-Ches/Eliz STP	97,400	284,140	-66%
3	Mathews	Mathews Courthouse STP	210	580	-64%
4	Northumberland	Reedville STP	260	580	-55%
5	Lancaster	Kilmarnock STP	1,780	3,310	-46%
6	Accomack	Onancock STP	1,550	2,140	-28%
7	Accomack	Tyson-Temperanceville	43,900	36,530	20%
8	Northampton	Cape Charles STP[1]	790	NA	NA
		Basin Total =	**146,260**	**330,800**[2]	**-56%**

Table C-10:
Eastern & Western Coastal Basins - 2001 Point Source Nitrogen Discharge Inventory

RANK	LOCATION	FACILITY	2001 TN LOAD DISCH. (lbs/yr)	1985 TN LOAD DISCH. (lbs/yr)	% CHANGE 1985-2001
1	Lancaster	Kilmarnock STP	5,810	9,680	-40%
2	Accomack	Tangier STP	2,770	3,420	-19%
3	Accomack	Tyson-Temperanceville	241,530	277,400	-13%
4	Mathews	Mathews Courthouse STP	1,920	1,710	12%
5	Northumberland	Reedville STP	1,970	1,710	15%
6	Virginia Beach	HRSD-Ches/Eliz STP	1,546,870	995,790	55%
7	Accomack	Onancock STP	11,610	6,260	85%
8	Northampton	Cape Charles STP[1]	5,880	NA	NA
		Basin Total =	**1,818,360**	**1,302,790**[2]	**+40%**

NOTES: [1] Cape Charles STP was off-line in 1985, therefore no loads are available for comparison.
[2] The 1985 Basin Total includes loads from treatment plants that have since gone off-line.